



SATURDAY, JUNE 17, 1871.

Contributions.

NARROW-GAUGE RAILROADS.

St. Louis, June 6, 1871.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Permit me a few remarks on the article on "Gauge, etc.," in your issue of June 3d.

The advocates of narrow-gauge roads may be divided into two classes:

1st. Those that claim that within certain limits, for certain purposes, they are preferable on the score of economy to wider-gauge roads.

2d. Those who consider their advantages without limit, and whose idea of a perfect railroad is, apparently, a single track and a train of velocipedes.

With this second class argument is useless. Against the first, I do not see that the author of the article in question has proven anything. He states that, with a given load, the advantages (he concedes some advantage) are not worth consideration, but he assumes as that given load the capacity of the wider road. We do not claim that a 3-foot road can do the work of a 4 feet 8½ inch, but that when we want one-half that work the 3-foot road is *sufficient and cheaper*. He expresses our whole theory when he says that it is not necessary to use a 30-ton locomotive to do work for which one of 15 tons is competent. He says that if the capacity of a 3-foot road is greater, at the same cost, than of a 4 ft. 8½ inch, the *management* of the latter is *bad*. True: they have employed "a man to do a boy's work." But we do not claim that; we only say that, working the 3-foot road to its full capacity, it can perform that work at less cost than the 4 feet 8½ inch, though it may be unable to work up to the capacity of the larger road at any cost.

He instances the Pennsylvania Central and Erie, and gives these figures:

Roads.	Length.	1868-69. Pass. 1 mile.	Rate.	1868-69. Freight 1 mile.	Rate.
Penn. Cent.	1,205	277,903,358	2.61 c.	1,428,486,873	1.08 c.
Erie.....	1,255	252,68,042	2.44	1,413,528,415	1.68

He then takes the earnings for four years—1865, '66, '68 and '69. Why take four years? It proves nothing in connection with the other figures for two years, and what do they show?

Road.	1868-69. Passengers.	1868-69. Freight.	Total.
Penn. Central.	\$7,253,277.64	\$15,427,653.21	\$22,680,930.85
Erie.....	6,167,540.22	23,911,817.59	30,079,357.81

Or, in plain English, if his figures are correct, the Erie, during the years 1868 and 1869 charged 31½ per cent. more for carrying less freight and fewer passengers than the Pennsylvania Central.

He next quotes the report of the Massachusetts Committee: "The difference in cost between narrow and wide-gauge roads is nearly one to two, without reducing necessary efficiency," and he replies, "This cannot be correct, as the capacity of a road is reduced much faster than the cost." The question is not as to capacity but efficiency. You acknowledge that the cost is reduced. If, then, the narrow road will do our work, is it not cheaper, and, therefore, preferable?

He then compares the Cologne & Geissen and the Pennsylvania Central, the cost per ton per mile being respectively 1¼ and 91-100 cents. Permit me to ask what are the respective lengths of these roads, and what would be the result if the Pennsylvania carried the same kind and amount of freight over a length of its road equal to the Cologne & Geissen, using its present cars and motive power?

As to the reports of the cost of 3-foot 6-inch roads in Australia, India and Norway, they are no guide to an opinion on the merits of the two systems, unless we have the cost of wide-gauge roads in the same countries, and these roads are certainly very cheap compared with the average of European roads.

As the article admits that in many cases much lighter rolling stock would serve on present roads, the only question at issue is, what reduction in cost is effected by gauge. He allows nothing but the saving in "length of axles and crossbeams of trucks." We claim that with the less width all the car work can be made lighter, and yet sufficiently strong to do the work required.

He states that the saving in grading, etc., averaging 20,000 cubic yards per mile, will not exceed 1-25, or 4 per cent. Assuming the embankment 70 feet wide at top, and the slope 45 degrees, we will have area of cross section 11.36 square yards; width at top, 2.33 yards; at base, 7.13 yards; height, 2.4 yards. Reducing the width 2 feet at top, we save $2.4 \times .86 \times 1760$ yards = 2780 cubic yards per mile, or over 13½ per cent.

Assuming that we use the same size of tie, cutting off two feet in length, we save certainly 2-7 or 28 per cent., instead of the 1-16 he allows.

As he states, we save nothing in iron if we use the same; but if, instead of 56-lb. we use 30-lb., we use only 52.8 tons instead of 98.5 tons, which, at \$75 per ton, is \$3,427.50 per mile.

I do not believe that a narrow-gauge road can do the work of the Erie, but that there are many sections of the country where they can do all that is required, and at a profit, while the wide-gauge road would not pay for years to come; and I do not believe that because we have not the money to build roads capable of doing the estimated work of the next century, we are to build none. G.

A METHOD OF CONDUCTING A RAILROAD SURVEY IN A NEW, WOODED COUNTRY.

BY JAMES D. BURR.

Let us assume at the outset that the termini of the road and the intermediate points through which it shall pass have been already determined, and that it is now required to "look out" and survey a route or routes which shall satisfy as many of the conditions of a good road as the nature of the circumstances shall warrant or demand.

The principal conditions for a good road are: 1st. That it shall be as direct as possible. 2d. That the grades shall be light and the curves easy. 3d. That it may be constructed cheaply.

The first matter of importance, then, is to become acquainted with the general features of the country. The best information which the engineer can hope to obtain of the country is from notes and plats of the government surveys, which can be had always at the land offices. But as the surveys are made in a hurried and careless manner, it is not to be presumed that the notes will be very accurate. Still they show the crossing of streams on section lines, and the lakes and swamps, with tolerable accuracy, and in some instances descriptions of the surface of the ground: whether generally level, hilly or swampy, also the character of the soil, and, most important of all, the direction of streams. They are of an unreliable character, however, in regard to the topography of the interior of sections.

From these data the engineer may determine generally where the line should run, and, after making a rough map and platting a line or lines on it, is prepared for a personal inspection of the country. It would not be wise, perhaps, considering the limited knowledge which the engineer has of the country, to put a large party of men in the field to make the first survey or reconnaissance.

It will be best then to select three or four men, generally intelligent and thoroughly versed in wood-craft, to accompany the engineer on the first exploration. The only instruments necessary are a pocket compass, a tape line and, perhaps, a hand level. One of the men should be able to run out with the pocket compass the line which has been traced out on the map, keeping the distance traversed by pacing, which may be best done, perhaps, by counting every other step, each one of these with a little practice may be taken at five feet, or 1,056 double paces for a mile. Soon the process becomes mechanical and may be done with much accuracy. Rude as this method may seem, instances are numerous where lines have been thus run across sections with an error of only a few feet in bearing, and within a hundred feet in distance. As near, perhaps, as it was afterward found to have been measured by the government surveyors. The bearings of lines can be run very well indeed with a good pocket compass. Get one not too sensitive, or it will not settle when held in the hand, which will be exceedingly annoying when mosquitoes are thick. The excess or deficiency in the distance across the section should be taken up on the section lines; that is, the count should begin one every section line crossed. The correction in bearing can be determined approximately by measuring to the nearest "section corner" or quarter post.

Such topographical notes of the country passed through as are of importance should be taken, such as the crossings of streams, their distances from section lines, depth, width, rapidity of current, direction, and character of bottom, whether firm, sandy, stony, or otherwise; the nature of the banks of the stream—whether high and abrupt, whether they appear

on both sides near the stream, whether high on one side and a low wide valley on the other; whether swamps extend along the borders of the stream, or whether the valleys appear ever to have been overflowed. If it should appear that a long deep cut or fill would be necessary, or if the stream should make too great an angle with the direction of the line, a more suitable crossing must be sought. If such can be found, it will be judicious to locate the point accurately by measuring with the tape line from some known point, so that it may be taken as one of the controlling points when further surveys are made. Hilly portions of the country should be noted particularly, as these, generally speaking, are the chief difficulties to be overcome in railroad engineering. A probable means of avoiding hills also can be suggested.

In very rough country it is generally advisable to follow the course of streams, unless they be very tortuous, when their direction is nearly that of the proposed route. These considerations must be left to be more fully developed by the subsequent operations of the surveying party proper.

The quality of the soil, kind of timber, and the vicinity of good springs of water should also be mentioned. Many of these items may, at first, appear trivial, but they are really important, many times, in deciding upon the future line of operations, such as suggesting good camping grounds. As a general rule, there is no danger of taking too many notes. Other members of the party can be made useful in searching out the course of streams, winding around hills and following up section lines. In this way a large extent of territory may be passed over rapidly, and a good idea of the controlling features of the country obtained.

A diagram of the sections crossed should be made in the field book, in which, also, the bearing of the line should be particularly noted, and distances on section-line from corners; also, distance across sections, as paced, so that sections may be made, if necessary.

Notes like the following may be made on a convenient page of the field-book.

"500 ft. from section line, surface slopes gently to S. W., rising gradually to N. and E.

"1,000 ft., descending bluff, 15 feet high, to cedar swamp. Found muck 10 ft. deep.

"1,400 ft. E. bank Little Salt River, 100 ft. wide, 8½ ft. deep. Sand and gravel bottom.—Cross angle, 75°.—Current rapid.—Good pine on east side of stream.—Soil, light sand."

An axe-man will be useful to "blaze" a few trees occasionally, so that the line can be found at a future time, if desired. If the party is not provided with a hand-level, or something of the sort, much will depend upon the good judgment of the topographer in regard to the rise and fall of the surface. Indeed, this cannot be done without accurate observation, with any approach to truth. The rapidity of the flow of streams will assist the engineer materially in forming an opinion in this particular.

From such additional data as this exploration has given, he is now ready to undertake a more thorough and systematic survey of a route or routes corrected wherein he may think it advisable.

If the exploration has shown that there are no difficulties of moment to overcome, a permanent location may be made at once; but if there are difficulties it will be advisable to make a "preliminary survey" of the whole route.

THE PRELIMINARY SURVEY.

Perhaps the best and most economical party for an ordinary survey would be composed as follows:

Engineer in charge, topographer, compass-man, leveler, rod-man, two chain-men, and three axe-men, making, in all, a force of ten men. This will be further subdivided into three parties, the "exploring party," the "compass party," and the "leveling party."

In the woods, where nothing can be seen except in the immediate vicinity of the ground passed over, much depends upon the activity and good judgment of the exploring party. The engineer-in-chief should therefore make, or have made, systematic explorations on each side of the surveyed line, and, if he can look out ahead of the compass party, by one day's work even, he will be able to facilitate the operations to a great degree, besides getting a good knowledge of the country, his judgment being corrected from day to day as the levels are taken over the line. In this way suitable points can be selected from which to start new lines, to avoid unfavorable parts of the old line.

Where there is no local attraction, which but rarely occurs except in the Lake Superior country, a transit instrument should never be taken in the woods on a preliminary survey. Experience will bear us out in saying that less accurate and less rapid work is done with the transit than with the compass. It is assumed that a needle line only is run and the superiority of the needles usually put in the compass over those in the

transit is a matter about which there can be no question. On the preliminary survey the obstructions, such as large trees, upturned roots, and old logs in windfalls, are not cut out of the way. It may be exceedingly difficult, therefore, in many places, to "set up" the instrument, whilst there is a great tendency to run partly by back-sight and partly by the needle, instead of using the back-sight as a check upon the work; in which case, unless the instrument be properly in the line, small angles will be more or less frequently introduced. Moreover, the transit is made to do accurate not rough work, and in bringing the needle to the required division on the limb by means of the tangent screw, the movement is so gentle that, if the pivot be a little rough, there is great danger that the needle also will partake of this movement. A smart tap on the legs of the instrument, however, will sufficiently disturb it. There is another important consideration worth taking into account, and that is the comparative ease of carrying the two instruments. In swamps and through windfalls the transit is very cumbersome, and great care must be taken not to injure it.

A compass furnished with a tripod has nearly as many objectionable features as the transit. The "Jacob staff" meets all the requirements. It can be quickly and accurately placed in line, and is sufficiently steady for rough work. It frequently happens that it is desirable to "set up" on a log, an upturned root or a stump, and there is scarcely any conceivable place, supposing it sufficiently stable, in which the Jacob staff cannot be placed. When "pickets" are used it is more convenient to use the staff, as it can be used as a picket and accurately placed in line. In setting up the compass behind trees where there are many roots, the staff is far superior to the tripod. No more than ordinary care need be taken to get on the line behind a tree. Suppose the compass is placed six inches off the line; it must be borne in mind that the line must be continued parallel all the time, and in setting up a thousand times or more there is a strong probability that the errors on one side will nearly balance those on the other. Moreover, the daily variation of the needle forbids us to expect very correct results from this instrument, so that it is possible for us to do less satisfactory work by using excessive care than by a more hasty procedure.

MANNER OF RUNNING THE LINE.

The compass-man should have no other duties than that of directing the work on the line. The line should be cleared of small brush and trees and overhanging limbs of trees, so that it will present a tolerably fair field for the leveler. It should be well marked by blazing trees and pickets placed in line from 60 to 150 feet apart. They should be about 5 or 6 feet long, so that they will stand in the ground at about the height of the eye. At this height they can be placed more nearly in line. The pickets nearest the compass should be at such a height that they will not interfere with the line of sight to more remote pickets. The pickets should be blazed at the top on both sides, so that they can be the more readily seen from the compass.

If it should be desirable to set the compass or transit on the line at some future time for the purpose of taking its bearing, or for the purpose of commencing location, the pickets indicate the line perfectly. They also facilitate the operations of the compass party and guide the axe-men in their work, showing them where the line is. The line may be produced for a thousand feet or more by pickets should no obstacle occur in the line to prevent. They are useful to the compass-man when it is necessary to set up the compass behind trees, for if he can see the pickets by stepping first on one side of the tree and then on the other he can guess very closely where the line comes behind the tree. The chain-men, too, by keeping in range with the pickets, are enabled to chain on a straight line.

A topographer keeps the notes of the alignment and takes topographical notes in the immediate vicinity of the line. He will not have time to make an accurate topographical survey of the country, nor is it necessary in railroad engineering generally. All that he possibly can do is to take notes of the line, crossings of streams, their direction and width, depth, etc., and sketch the contour lines of hills, and the location and extent of lakes and swamps; his duties being substantially the same as that mentioned previously. The notes should be taken with care. Each page of the note book may be divided into two equal parts, nearly, by a red line which represents the line of the survey. It is then divided up into squares which may be taken to represent 100 feet each way—or 50 feet, or 200 feet, as convenient.

The topographer, at the several stations, paces out right and left to any point to which he desires to know the distance—such as the foot of a hill, the bank of a

stream, the margin of a lake, or the edge of a swamp. These distances, with perhaps their bearings from certain known points, he transfers to the compass book. It will be expeditious to have a pocket-compass and run out independent lines, in a country where there are many changes in the surface, thus obviating the necessity of returning to the line from every station that has been taken as a starting point. It is not presumed that these distances will be correct to within less than five feet in a hundred, or twenty feet in a thousand.

The attempt is sometimes made to sketch in the contour lines of hills; but without an accurate topographical survey—which would be of little use compared with the cost of making it—nothing like a truthful representation can be made of them. A good plan, and one more useful and reliable, is to estimate the height of the ground above or below the surveyed line at the several stations, at distances of 100, 200 or 300 feet from the line to the right or left, and enter the heights in the field-book, thus: At station 6, 300 feet to the left, we say "+10," indicating ten feet above station 6. At station 7, 400 feet left, "+25," and so on. Therefore, should the profile show that the ground line is too low near these points, which are marked as being higher, the line, perhaps, might be shifted to pass through more desirable points. In running over very rough ground it may be desirable to take side levels, making a sort of cross-section, which, after being platted, will indicate generally the points through which the line ought to pass.

The only way in which to get the best line through rough country, especially so in a dense forest, is to keep trying.

Measurements to the section corners should be made with the chain and with some care. Future calculations may depend upon these measurements, and they are required in mapping the line when the survey is finished.

It is generally more convenient to record the magnetic bearing, and, in plating the survey, the variation of the needle being known, the magnetic meridian being laid down, the plating may be made from that without any delay in calculating the true bearing from the magnetic.

I am of the opinion that it would be an improvement in the manner of graduating the compass to reckon round from a zero point to 360°. The zero might be conveniently taken at the East point, as now marked. A bearing "90°" would be as intelligible as "North;" "95°" would be just as easily understood as "N. 5° W.;" "180°" as "W.;" "275°" as "S. 5° W.;" This would do away with all vexation in determining whether the variation is to be added or subtracted in order to find the true bearing. Thus, if the needle points 2° to the east of true North, the variation must be added in every case, and if the needle points East or to 0°, the true bearing is 2°, or 362°; if N. it would be 92°, or N. 2° W. for true bearing. If, however, the variation be West, the variation would be subtracted in all cases, in the method here proposed.

[TO BE CONTINUED.]

Care of Pullman Cars.

Mr. Charles Nordhoff, who was pretty well known some years ago as the writer of popular books of travel, but of late has been one of the editors of that exceedingly well edited journal, the *New York Evening Post*, has recently made a journey to California, and, like the rest of mankind, is delighted with the Pullman cars. He gives the following account of the manner in which they are kept clean and cared for:

"The sleeping cars are scrupulously clean; of their comfort I have told you in a previous letter. In the Pullman cars a conductor and a porter accompany each car; the Central Pacific cars have only a porter; but on each these servants are admirably trained, civil and obliging to the last degree; quiet, always at hand, and ready to give notice beforehand of meal times, and to afford other information. Nothing could be better or more comfortable than the apt way in which these men perform all their duties.

"Some of the ladies of our company, being 'house-keepers,' were curious to know how the sleeping cars, used as they are by all kinds of travelers, were kept so clean and tidy; and in my endeavor to satisfy this curiosity of theirs, I came upon some other particulars of the management of the cars which may interest you.

"First, as to their care: Whenever a Pullman sleeping car arrives at the end of a journey, it is laid over for twenty-four hours. The porter gathers up the soiled linen, which is taken at once to the laundry, and a force of men and women then enter the car, take out all the cushions, carpets, mattresses and blankets beat them all with rods, and hang them in the sun. All the windows of the car are thrown open, and whatever is movable being taken out, all the woodwork is thoroughly washed, and perfectly ventilated and freshened.

Toledo & Louisville.

Ground was broken at Dunreith, Ind., on the 13th inst., on the Panhandle road, 38 miles east of Indianapolis, on the Louisville & Toledo Railroad, which, it is reported, is to be pushed forward rapidly.

The Chicago, Burlington & Quincy Railroad Telegraph.

The following article appears in the *Telegrapher* of June 3, signed "F. L. P.," whom we suppose to be the well-known electrician, Mr. F. L. Pope:

The Chicago, Burlington & Quincy has always been justly considered one of the model railroads of the west. The great care and efficiency of its management, and the attention which is paid to even the minutest details of its construction and operation, cannot fail to attract the attention of the observant traveler who has occasion to pass over any portion of its main route, or of its almost innumerable branches. From the well-known enterprise and liberality of this company, in testing and adopting all the latest improvements tending to enhance the comfort, safety and convenience of its passengers and employees, it is but natural to expect that we should find a well equipped, well managed, and efficient telegraph department, forming an important and indispensable adjunct to the proper supervision of the movement of trains, and of the general business of the road.

The main line of the road extends from Chicago to Burlington, a distance of 207 miles, but the numerous cross roads and branches belonging to the company swell the aggregate length of track to 756 miles. The line of poles on the main road from Chicago to Burlington and Keokuk, and also from Galesburg to Quincy, originally belonging to the Illinois & Mississippi Telegraph Company, but now form a portion of the Western Union system. One wire over each of the above routes is owned by the Western Union, and used for commercial business. The remainder of the poles and wires on the road and its branches belong to the railroad company. The receipts from commercial business are divided in a certain agreed proportion between the railroad and telegraph company, as is usually the case throughout the West.

The total extent of the telegraphic system of the Chicago, Burlington & Quincy Railroad will be seen from the following statement:

	Miles of Poles.	Miles of Wire.
Chicago to Burlington.....	(W. U.)	494
Galesburg to Quincy.....	"	200
" " Peoria.....	53	100
Aurora to Galena Junction.....	7	7
" " Geneva.....	12	15
" " Streator.....	55	60
Buda to Rushville.....	110	110
Burlington to Quincy.....	70	72
" " Keokuk.....	(W. U.)	43
Mendota to Prophetstown.....	45	45
Galva to New Boston.....	51	51
	404	1134
No. of Offices.....		137
" " Operators.....		200
" " Repairmen.....		7
" " Train despatchers.....		8

The Superintendent of Telegraph is Mr. Fred. H. Tubbs, whose headquarters are at Galesburg, Ill. He is assisted by two Division Operators, Mr. W. D. Sargent, who is stationed at Aurora, and has charge of the wires between Chicago and Mendota, and Mr. W. J. Edgar, at Burlington, whose division extends from Burlington to Quincy and Keokuk. The remaining and central portion of the system is under the immediate charge of the Superintendent.

It needs but a slight inspection of the telegraph lines and offices of this company to see that they are under the charge of a practical electrician, who understands his business, and who attends to it. The same thoroughness and attention to details that characterizes every department of this great railroad is equally apparent here. Eight years ago, when Mr. Tubbs took charge of these lines, the best attainable mode of insulation was such as to render it impossible to get a good working line in wet weather, except by the use of a large conducting wire. He therefore put up a No. 7 wire, regardless of the ridicule and opposition which he met with from the telegraphic officials of that day, who, as is often the case now, went considerably out of their way to oppose a meritorious improvement on a line with which they had nothing to do. The large wire proved a success, of course, and its use was continued until, at the present time, about 700 miles of No. 7 wire have been put up on the principal routes of this company, with the most satisfactory results.

The poles used are of white cedar, from the northern part of Wisconsin, 25 feet in length, except at crossings and other special points, where longer ones are necessary. These cost about a dollar each, delivered on board the cars at Chicago. They are set five feet in the ground, and usually thirty to the mile. The common glass insulator, on wooden pins and brackets, has been used until within two or three years, since which Mr. Tubbs has adopted the Brooks insulator with the usual satisfactory results. He now has about 240 miles of wire on this insulator, and intends replacing all his glass insulators with it in the course of time, as the lines are gradually repaired and rebuilt. The conditions on this line were unusually favorable to the satisfactory performance of the glass insulator, on account of the large conductor employed, and the favorable climate, but the motto of this company is to "Get the best," which they have accordingly done in insulation as in all other matters.

The greater portion of the instruments used on the line are Tillotson's main-line box sounders. The employment of these instruments saves much expense and annoyance incident to the use of local batteries, but could hardly have been carried out successfully on wires less carefully constructed and maintained. As it is, they work as well as could be wished for.

All the minor points about the lines, which are too often neglected in many instances, are here looked after with religious fidelity. Every connection on the lines and in the offices is carefully soldered. The office wires are of No. 12 copper, and run with great care, and the leading in wires at the offices scientifically arranged and sheltered from rain and moisture. In the planning and execution of the engineering details Mr. Tubbs has

been ably seconded by E. P. Warner, who has immediate charge of the construction and repairs, and whose work is a sufficient endorsement of his intelligence and ability.

One of the finest specimens of telegraphic engineering in the West is the crossing at the Burlington Bridge, on the Mississippi, on the Chicago, Burlington & Quincy line. It is necessary to carry the wires over the draw at a height sufficient to clear the tallest steamboat chimneys at high water. This has been accomplished by erecting three pyramidal towers of frame-work—one on the center of the draw, and one on the stationary portion of the bridge, each side of the opening. Each tower supports three cross-arms carrying two wires each, the arms on the central tower being arranged upon a spindle, by means of collars, so that when the draw is swung round at right angles, to admit the passage of a steamer, and the central tower moves with it, the cross-arms maintain their original position at right angles to the wires and the line of the bridge. The wires at this point are ninety feet above high water mark. This crossing was constructed in 1868, and several similar ones are about to be established at other points along the river.

The system of moving trains by telegraph on this road is an excellent one, and merits a passing notice, though in many respects it differs but little from that employed on other roads. The movements of trains are controlled by the Train Dispatcher—one dispatcher being on duty at all times on each division of the road. He has full power to run any engine or train by telegraph that he thinks proper, and no wild or extra train is allowed to run the road without his knowledge or instructions, unless following a regular train to the nearest station where they can obtain telegraphic orders. Each train is designated on the time schedule and elsewhere by a particular number. The orders from the dispatcher are received by the operator, and written down upon a form as follows:

**CHICAGO, BURLINGTON & QUINCY RAILROAD
TRAIN ORDER.**

From *Burlington*..... To Conductor and Engineer No. 2 at *Carthage*..... Station.
May 1, 1871.
You will run to Adrian and meet No. 2 there.
Answer how you understand, and get my answer before starting.
Signed, W. J. E.
Received 8.45 A. M. by M. N. Operator.

This is shown by the operator to the conductor of train No. 2, who writes his understanding of it upon another blank, in the following form, which is telegraphed back to the dispatcher:

**CHICAGO, BURLINGTON & QUINCY RAILROAD
TRAIN ORDER.**

To W. J. E. From *Carthage*, May 1, 1871.
to run to Adrian and meet No. 2 there. I understand I am
Is this right? Signed, X Y Z., Conductor.

If the understanding is correct, the dispatcher gives the operator O. K., who indorses it upon the original order and delivers it to the conductor, who then, and not before, proceeds to carry it into effect.

If it becomes necessary to hold a train at some station to await the arrival of another train, the dispatcher sends an order to that effect to the operator at that station. Each station is provided with a white signal, in full sight of the engineer when approaching from either direction, and also of the operator as he sits at his instrument, and these signals are controlled by a simple mechanical device within reach of the operator's hand. When he receives orders from the dispatcher to hold a train, he sets the green signal, and then replies that the train is held. If, on coming into a station, the engineer discovers a green signal, he comes to a full stop, until orders are received from the dispatcher to move forward.

Under this system it is evident that no collision or interference can possibly occur, except through an error of the dispatcher, or the grossest violation of distinct and easily remembered orders. By placing the movement of trains under the complete and absolute control of one man the chances of accident are reduced to the lowest minimum. The position of the dispatcher, however, is one of great trust and responsibility. It is generally filled by appointment from among the better class of operators, who have distinguished themselves by fidelity and accuracy in the discharge of their duties in that capacity.

It will be seen, from what has been said above, that the telegraph department of the Chicago, Burlington & Quincy Railroad does not suffer in comparison with any of its other departments. The managers of the railroad are evidently fully alive to the fact that the telegraph is the right arm of the service, and having been fortunate in securing a competent and energetic Superintendent and able corps of assistants, do not rest there, but gladly afford them the means and facilities to make the telegraphic department as complete and perfect as possible. We congratulate them on the result. It would be hard to find a better working or better managed system in the United States than the one under consideration; it reflects the highest degree of credit upon all concerned. It is, also, not out of place to observe that a more intelligent, courteous and gentlemanly set of operators than those employed on Mr. Tubb's wires are very seldom met with. Every man seems to feel a just pride in having helped to earn and maintain the well deserved reputation of the line; and this is, no doubt, one of the principal causes which have led to such a satisfactory result.

Governor Hoffman sent to the Secretary of State, of New York, on the 13th inst., the State Aid Railroad bill, not approved.

ELECTIONS AND APPOINTMENTS.

—C. P. Oakley, long the General Ticket Agent of the Mississippi & Tennessee Railroad, has severed his connection with that company and accepted a similar position on the Memphis & Little Rock Railroad, to take effect June 15th.

—At the late annual meeting of the Leavenworth, Lawrence, & Galveston Railroad Company all the former directors were re-elected, as follows: Nathaniel Thayer, H. H. Hunnewell, John W. Brooks, Charles Francis Adams, Jr., Sidney Bartlett, James H. Blake, John A. Burnham, Wm. F. Weld, Boston; James F. Joy, Detroit; James M. Walker, Clarence I. Peck, William Sturges, Chicago; Charles R. Moorhead, Leavenworth. It is reported that Mr. O. Chanute, Chief Engineer, has been appointed Superintendent in place of M. R. Baldwin, resigned.

—On the 13th inst. the vacancies in the Board of Directors of the Gilman, Clinton & Springfield Railroad Company were filled, by the appointment of the Governor of C. H. Moore, of DeWitt County; John Williams, of Sangamon, and A. S. Guthrie, of Ford. The directors then proceeded to organize by electing the following officers: S. H. Melvin, of Springfield, President; Wm. Fuller, of DeWitt, Vice-President; George N. Black, Springfield, Treasurer; J. W. Lane, Springfield, Secretary; Jno. T. Stuart, Attorney.

—At a meeting of the stockholders of the Mississippi River Railroad Company held at Memphis, on the 13th inst., the following directors were elected: A. T. Lacey, P. E. Morton, F. M. White, M. Merriweather, D. M. Henning, C. H. Hill, S. R. Latta, J. Overton, Tom Boyle.

—At the annual meeting of the Madisonville & Shawneetown Railroad Company, on the 3d inst., the following directors were elected: George W. Noel, R. J. Laughlin, Thomas K. Givens, John H. Parker, G. Brooks, Wm. L. Gordon, and one other, whose name we have not learned. Mr. Gordon was re-elected President.

—Mr. Geo. W. Cushing, who for many years held the position of Master Mechanic on the Chicago & Northwestern Railway, and who for the past year has been Superintendent of Machinery of the Kansas Pacific Railway, has been appointed Superintendent of Machinery of the Northern Pacific Railroad, and is to enter upon his duties on that road July 1. Mr. Cushing has, we learn, succeeded within the past year in placing the rolling stock of the Kansas Pacific in excellent order, and he retires from the service of that company with the best wishes and highest encomiums of his superiors. The Board of Directors, in accepting his resignation, passed very complimentary resolutions. His numerous railroad friends throughout the country will be pleased at his success.

—Mr. Abram Cross having resigned the position of Superintendent of the Galveston, Houston & Henderson Railroad, the duties will hereafter be performed by Robert Colwell, Manager.

—At the annual meeting of the Boston & Nashua Railroad Company, held at Nashua, N. H., lately, the following gentlemen were chosen officers for the ensuing year: Directors, Francis B. Crowninshield, of Boston; Daniel C. Richardson, of Lowell; Edward Spalding, of Nashua; Onslow Stearns, of Concord; Henry Sigourney, of Boston. Treasurer, Theodore H. Wood, of Nashua; Clerk, Edward P. Emerson, of Nashua.

—The annual meeting of bond and stockholders of the St. Louis, Alton & Terre Haute Railroad Company was held in St. Louis, June 5, and the following directors, whose term of service had expired, were re-elected: Levi Davis, of Alton; Anthony Thornton of Shelbyville; George W. Parker, of Charleston, Ill.; Thomas Dowling, of Terre Haute.

The new directors organized by selecting Charles Butler, of New York, President; George W. Parker, of Charleston, Ill., Vice-President; W. G. Broughton, General Superintendent; W. W. Thomas, Secretary and Auditor, and H. S. Depew, General Freight Agent. This company does not operate its own road, which is leased to the Indianapolis & St. Louis company; but it owns and operates the old Belleville & Illinois town Railroad, 14 miles long, and operates the extension of this road to Duquoin, 56 miles, which is the property of the Belleville & Southern Illinois Railroad Company.

—At the annual meeting of the stockholders of the Mississippi Valley & Western Railroad Company, held at their office in Canton on the 5th inst., the following named directors for the ensuing year were elected: John Tillson and S. H. Osborn, of Quincy; J. A. Hay and G. H. Simpson, of LaGrange; H. Davis and N. Rollins, of Canton; G. M. Ochiltree, of Waterloo; E. Pratt Buell, of Warsaw, and John Fallon, of Philadelphia. The Board of Directors were organized by the election of General John Tillson, President; Henderson Davis, Vice-President; N. Rollins, of Canton, Mo., Secretary; Dr. J. A. Hay, Treasurer, and Col. E. Pratt Buell, General Superintendent and Chief Engineer. Colonel Buell has appointed the following officers: H. L. Bacon, General Freight and Passenger Agent; Judge P. W. Plant, Assistant Engineer River Division; J. W. Whipple and Prof. R. A. Grant, Assistant Engineers Western Division; W. T. Rector, Chief Clerk; J. S. Pickering, Master Mechanic.

—At the annual meeting of the Peoria, Pekin & Jacksonville Railroad Company, held on the 8th inst., at Pekin, Ill., Lucius Hopkins, Edwin L. Trowbridge, Richard Arnold, James M. Constable, Lebeus Chapman, Jr., James F. Kelsey and John Allen were elected directors of the company for the ensuing year. At a subsequent meeting of the directors, John Allen was elected President. In this board, James F. Kelsey and James M. Constable succeed George J. Cobb and Aaron Arnold, of last year's board.

—The following are the directors of the California Pacific Railroad Eastern Extension Company, organized

at San Francisco on the 23d of May: William F. Roelofsen, Milton S. Latham, Richard Hammond, Isaac Friedlander, Albert Gansal, Eugene Sullivan, Faxton D. Atherton, San Francisco; John P. Jackson, Vallejo; A. DeLaski, Edward C. Greene, London, England; Rudolph Sultzbach, Frankfurt-on-the-Main; Wm. Tillinghast, San Francisco. The officers of the company are: William F. Roelofsen, President; Colonel John P. Jackson, Vice-President; Milton S. Latham, Treasurer, and W. H. L. Barnes, Secretary.

—Mr. Chas. H. Wood, formerly General Southwestern Passenger Agent, at Cincinnati, of the Pittsburgh, Cincinnati & St. Louis Railway, has been appointed Agent of the same company at Chicago, and Col. W. L. O'Brien assumes the duties of the position left vacant at Cincinnati. Mr. Wood has his office at the Halsted Street Station in Chicago.

—On the 12th inst., D. B. Waterman, of Aurora, and Norman Buckley were appointed by Governor Palmer as directors of the Chicago & Iowa Railroad Company, under the provisions of the act of the General Assembly, in force April 16, 1869.

—At the annual election of directors of the Walkill Valley Railway Company, recently held at New Paltz, N. Y., the following gentlemen were elected for the ensuing year: Seth M. Capron and John C. Scofield, of Walden; Edmund Bruyn, of Shawangunk; Abner Hasbrouck, Floyd S. McKinstry and A. D. Deyo, of Gardiner; A. V. N. Eltinge and Jacob Le Fevre, of New Paltz; I. Schoonmaker, of Rosendale; C. S. Kiersted, R. Bernard and J. E. Ostrander, of Kingston, and Erastus F. Mead, of New York. F. S. McKinstry was re-elected President; Abner Hasbrouck, Vice President; H. D. Deyo, Secretary; A. V. N. Eltinge, Treasurer; James G. Graham, re-appointed Counsel to the Board, and R. Bernard was appointed Associate Counsel; Levi C. Bruyn re-appointed Chief Engineer.

—At the annual meeting of the stock and bondholders of the St. Louis, Jacksonville & Chicago Railroad Company (whose road forms the Jacksonville Division of the Chicago & Alton), the following were unanimously elected directors: John J. Mitchell, Alton; Charles D. Hodges, Carrollton; L. E. Worcester, Whitehall; John Crear and T. B. Blackstone, Chicago; Henry J. Straum, Mason City; Stephen Dunlap, Jacksonville; N. W. Green, Pekin; George Straut, Tremont, all of whom were members of the last board. George Straut was elected President, and D. B. Howard, of Jacksonville, Secretary and Treasurer of the company; and George Straut, T. B. Blackstone, John J. Mitchell and John Crear, Executive Committee for the board for the ensuing year. The board voted to accept a proposition of the Chicago & Alton Railroad Company for a lease in perpetuity to that railroad of the Louisiana Branch, now in course of construction from Roodhouse to Louisiana.

—Mr. James Brown, late General Agent of the Lake Shore & Michigan Southern Railway at Detroit, has been appointed Assistant Western Passenger Agent of the same road in place of Mr. C. C. Cobb, who has lately been made General Passenger Agent of the Cleveland, Columbus, Cincinnati & Indianapolis Railroad.

—The Milwaukee & Northwestern Railway Company elected the following directors on the 14th inst.: For three years, C. J. L. Meyer, John S. McDonald, James Coleman; for two years, John R. Kohlsdorf, Henry L. Palmer, W. H. Hiner; for one year, M. Allenhoofen, Harrison Ludington, B. F. Moore. The directors elected the following officers: President, Hon. C. J. L. Meyer; Vice-President, Harrison Ludington; Secretary, J. S. McDonald; Treasurer, W. H. Hiner.

—At the stockholders' meeting of the Plymouth, Kankakee & Pacific Railroad Company, held in Kankakee, Ill., on the 14th inst., the old Board of directors was re-elected. The new board was organized by the election of James McGrew, of Kankakee, President; C. H. Reeve, of Plymouth, Indiana, Vice-President; John C. Cushman, of Plymouth, Secretary and General Agent for the Indiana Division, and S. N. Hathaway, of Kankakee, Treasurer. James McGrew, A. Buck, Colonel R. Plumb, S. T. Hanna and John C. Cushman, were elected as the Executive Committee.

—At the election of directors of the Winona & St. Peter Railroad Company, on the 14th inst., John F. Tracy, of Chicago; John M. Burke, A. G. Dulman, David Dows, O. B. Bayliss, and M. L. Sykes, Jr., of New York; H. H. Porter, W. H. Ferry, and J. H. Howe, of Chicago, were chosen. All are directors of the Chicago & Northwestern Railway Company, which owns the Winona & St. Peter road.

—On the 14th inst. the election of directors of the Chicago & Milwaukee Railroad took place, and resulted in the election of the following gentlemen: John F. Tracy, John M. Burke, A. G. Dulman, A. B. Bayliss, M. L. Sykes, Jr., H. H. Porter, W. H. Ferry, J. B. Redfield and J. H. Howe. All these except Mr. Redfield are directors of the Northwestern, and he is Assistant Treasurer of that company.

—The following directors of the LaCrosse, Trempealeau & Prescott (Winona Eastern Connection) Railroad Company were elected on the 8th of June: John F. Tracy, M. L. Sykes, Jr., J. K. Burke, A. G. Dulman, H. H. Porter, W. H. Ferry, James H. Howe, C. C. Wheeler and M. M. Kirkman. All but the last two are also directors of the Chicago & Northwestern. Mr. Howe is the Solicitor and Mr. Kirkman the General Accountant of that corporation, which owns the Trempealeau road.

United States Railroad Clerks' Insurance Association.

The annual meeting of this association was held in Louisville, Ky., on the 14th inst. This is the association which was organized in Philadelphia in October, 1869. It now numbers 1,774 members. The assessments last year amounted to \$7,562. The finances are in good condition; after all payments and forfeitures the association had \$600 in bank.



PUBLISHED EVERY SATURDAY.

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Editorial Announcements.

Correspondence.—We cordially invite the co-operation of the Railroad Public in affording us the material for a thorough and worthy Railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Inventions.—Those who wish to make their inventions known to railroad men can have them fully described in the RAILROAD GAZETTE, if not previously published, FREE OF CHARGE. They are invited to send us drawings or models and specifications. When engravings are necessary, the inventor is expected to furnish his own engravings, or to pay for them.

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

Engineering and Mechanics.—Mr. M. N. Forney, Mechanical Engineer, whose office is at Room 7, No. 73 Broadway, New York, has been engaged as Associate Editor of this Journal in charge of these departments. He is also authorized to act as our agent.

ENGLISH AND AMERICAN IRON BRIDGES.

Some two months ago tenders were solicited for the construction of iron railway bridges of spans of 100 and 200 feet, by the Intercolonial Railway of Canada, connecting Quebec and Halifax. This call was very generally responded to, there being tenders put in by nineteen English, one Belgian and sixteen American bridge builders.

The specification, which was a rigid one, called for uniformity of strength, but left the design open to each person. The bridges were to be all of wrought iron, capable of bearing $1\frac{1}{2}$ gross tons per lineal foot, in addition to their own weight, without straining the iron in tension to over 10,000 lbs. per square inch. The iron of the 200 feet spans was to be capable of bearing 60,000 lbs. per square inch before breaking, and that of the 100 feet spans, 50,000 per square inch.

Much interest was felt as to the result of this competition, which was virtually one between the English and American systems of bridge-building. The decision was that the long spans were awarded to an American firm, Messrs. Clarke, Reeves & Co., of Phoenixville, Pa., and the short spans to English bridge-builders, the Fairbairn Manufacturing Company, of Manchester. Of the thirty-six plans submitted, only three or four were rejected on account of not coming up to the specified strength.

The bridges of Clarke, Reeves & Co. were selected for the long spans, not only as being undoubtedly first-class, both in material and workmanship, but also as being the lowest responsible tender. Some curiosity has been expressed to know how American bridge-builders, using higher-priced iron, and paying higher wages for labor than their English competitors, could yet build a less costly bridge.

While it is to some extent true that the specification allowed of a lower quality and less expensive iron for the 100 than for the 200 feet spans, yet one of the principal reasons why an American firm was lowest on the long and an English firm on the short spans, is owing to the less weight of iron required by the American system of bridge, and this is more apparent the longer the span.

Some persons erroneously suppose that the more iron there is in a bridge the stronger it will be. But a little reflection will show that it is only the iron that is "working," or, in other words, that is actually strained

by the load, that contributes to the strength of the structure. All the rest is dead weight and merely weighs down the bridge. In very short spans this is not disadvantageous, as it tends to diminish vibration, but in long spans, where the weight of the bridge much exceeds that of the load passing over it, every pound of iron that does not contribute to the strength of the bridge is a positive injury. To illustrate this more clearly—if one bridge weighs 125 tons and another 250 tons, and both are strained by the rolling load 10,000 lbs. per square inch, the lighter bridge is the stronger of the two. But if the 125-ton bridge be strained 10,000 lbs. per square inch, while the 250-ton bridge is strained only 5,000 lbs. per square inch, then the latter has really double the strength and double the life of the former; for half the iron may corrode away, and then the working area of the bars will be equal. It is not clearly perceiving this fact—that the strength of a bridge depends upon the "working area" of its parts—that has led our English friends to make such heavy bridges.

In several plans, if the strains per square inch are alike from similar loads they must all be of the same strength, providing the connections are equally perfect. Some take more iron than others to effect the result, but the result is the same.

The lightness of American bridges is due, 1st, to the concentration of material along the lines of strain, which enables a lighter web system to be used and hence a higher truss; 2d, to this greater height of truss, which throws less leverage on the upper and lower chord systems, and hence requires less iron in their member; 3d, to the use of eye and pin connections instead of rivets, by which there is no waste of metal to compensate for the deduction of rivet holes.

American bridges are stiffer vertically and better braced laterally than English bridges, their greater height giving less deflection under a load, and allowing of overhead bracing as well as that below the track.

But the less quantity of iron required to do the work is not the whole explanation of the less cost of American as compared with English bridges. A second and equally important reason is the less amount of manual labor required to construct and erect them—owing to the general use of machinery in forming all the parts.

English bridges are made of low-priced iron, and require a great deal of it, and a great deal of hand labor in constructing and erecting.

American bridges have all their principal parts formed by machinery. They are of exactly uniform dimensions, in similar spans, and hence perfectly interchangeable, like the parts of the locks of American rifles, or of sewing machines. Hence, machine labor can be well applied to their manufacture and the cost at the works reduced to a minimum.

But American bridges have still another advantage. They are so made that nearly all the work is done at the shops, and they can be erected with the least possible amount of labor, and that unskilled. In fact, the cost of erecting the staging is the principal expense; after that a 200-feet span can be erected and made self-sustaining in the space of two days, if necessary.

But the English bridge is only about half done when the scaffolding is built and the iron placed upon it. It has then to be all riveted together, which is expensive, as the conveniences for such work at the site of a bridge are not often great. It is slow and tedious, requiring from two to three weeks to put together a 200-feet span.

Taking all these things into account, it will be seen how American bridge-builders have been able to compete with English firms on the large bridge at Buffalo, and in the recent case of the long-span bridges of the Intercolonial Railway of Canada.

WHY USELESS RAILROADS ARE CONSTRUCTED.

It can hardly have escaped the attention of those who carefully observe the progress of railroad construction in the United States of late years, that many lines have been constructed which could not possibly have a sufficient traffic to pay any satisfactory interest on their cost; and it must have surprised these observers that the means could be found for the construction of such roads, or, indeed, that any one should try to secure their construction, unless it were the people on the line, who might not be aware that a road unprofitable to its owners is usually of very little value to its patrons.

We republish, elsewhere in the GAZETTE, an article from the Nation, on the "Borrowing Powers of Corporations," which will go far to explain the lavish expenditure of capital in unprofitable enterprises in a country where money is always in demand on good security and at high rates. The men who plan, construct

and control these useless roads—who in the eye of the law are their sole owners—do not invest a dollar of their own means in them. The money actually paid for the stock is often a mere nominal sum, perhaps sufficient to pay the cost of a preliminary survey, when it cannot be obtained on credit, and very frequently not enough to pay one per cent. of the cost of the work. The road is constructed and equipped almost entirely from the proceeds of its bonds and those subscribed in its aid by towns and counties. The men whose money pays for the road are the bondholders, and they have nothing to do with its location, the letting of the contract, for its construction, or its management after it is completed.

But, it may be asked, what object can men have in borrowing money to construct an unprofitable road? It is plain enough that the managers of a profitable line might make handsome fortunes if they could construct their road with borrowed money, and so operate it as to pay the interest and the principal when due, from the net earnings, leaving the road at last theirs in fee simple, a magnificent reward for their enterprise and sagacity. But why should men borrow money for the sake of sinking it?

This question is not so difficult when it is remembered that our borrowing incorporators and directors let all the contracts for the work and material which the bondholders' money pays for. It is easy for them to form a contracting company or associate themselves with other contractors, and the contractor who has power to decide in favor of the acceptance of the very bids he offers ought not to make any unprofitable bargains. In fact, they make their own terms, which, for all the work and material, are usually exactly sufficient to absorb all the means at the command of the company.

Thus the most worthless of the railroad projects of the day are simply schemes for providing profitable work for contractors. It is true that it is somewhat easier to borrow money for a promising scheme than for one evidently worthless (though not so much easier as might be thought), but this is almost the only influence which leads the enterprising borrowers to locate their road wisely. They have no care for the future of the property. When the work of construction is over their interest in the line ceases, and they are willing that it should fall into the hands of the bondholders, who probably for much less than the amount of the money they have loaned could have constructed and equipped the road and held it in fee simple and free from debt.

There is danger that when some of these cunning schemes for plucking confiding lenders shall have come to their natural conclusion, the legitimate enterprises of the country will find that the deceptions of those counterfeiters will have affected the reputation and the borrowing power of the genuine. There is also danger—present as well as prospective—that well placed lines, with good prospects for profitable traffic, will be made much more costly than is necessary, by reason of the small interest of the stockholders and the managers in the property. The men who direct the location and construct and manage a railroad should be those whose money is invested in the enterprise, and whose profit depends entirely on the wise location and the economical construction and management of the line. When managers are interested in making the expenditures as large as possible, we can expect nothing but waste—waste which will affect the credit of all new corporations in the country, and be a tax on transportation to hundreds of communities. Here again we find a difficulty arising from the fact that the people of the country through which our railroads run are not to any considerable extent interested in their pecuniary success. Such evils would hardly exist if the people of a State supplied the money to construct the railroads of the State, and if they did, legislators would soon find themselves compelled to contrive, or try to contrive, some means of putting an end to them by law.

A New England Railroad Conflict.

There is at present a peculiar conflict between the Boston & Maine and the Eastern railroad companies, of New England. The latter line extends from Boston to Portsmouth, N. H., and the former from Boston to South Berwick, Me., 14 miles north of Portsmouth, on the Portland, Saco & Portsmouth Railroad. The last named road has been used by both Boston roads, which have run cars through between Boston and Portland, the Eastern's trains being taken on the Portsmouth road at Portsmouth, and the Boston & Maine's at South Berwick. Not long ago the Eastern Railroad Company obtained a lease of the Portsmouth road; it continued, however, to haul the trains of the Boston & Maine between South Berwick

and Portland, the laws of Maine providing that a connecting road shall draw the cars of the road with which it connects "at reasonable hours and at tolls not exceeding its ordinary rate." But within a few weeks the Eastern Railroad has put on two additional trains, one with Pullman cars, to run between Boston and Bangor. One of these stops only at Newburyport, Portsmouth and Saco between Boston and Portland.

The Boston & Maine hereupon made up a train to match the new day express on the Eastern, and demanded that it should be hauled between South Berwick and Portland. The Eastern refused to change its time table and stop its train for this purpose, and the passengers by this train were left for a later train, the Eastern claiming that any arrangement which should compel it to make a stop purposely to connect with the Boston & Maine's trains, is not a connection "at reasonable hours," in the eyes of the law. The Boston & Maine has, it is reported, commenced suit to test this question.

In most of the States a railroad company cannot be compelled to haul the train of another company over its road. It would be considered a matter of course that it would refuse to do so when such trains compete with its own. The law of Maine, it is presumable, was intended to affect just such cases, and though it is possible it might result in some cases, and under supposable circumstances, in great public inconvenience, is it not reasonable to believe that the law was made in the belief that the benefits to be secured by it would outweigh the possible disadvantages; and would the delay of five or ten minutes at South Berwick be considered an offset to the advantage of an additional and competing train?

It is easy to see that if this law was universal some companies would suffer severely by it. For instance, the Baltimore & Ohio might compel the Pennsylvania Company to haul its trains between Pittsburgh and Chicago; the Chicago, Burlington & Quincy might make up a train for Rock Island, draw it over its own road to its junction with the Rock Island at Pond Creek, 113 miles from Chicago, and then compel that company to haul it into Rock Island, and thus establish a route 15 miles shorter than that of the Rock Island road and rob it of a part of its business. So the Chicago & Alton could run a train between Chicago and Cairo *via* Bloomington and the Illinois Central; the Milwaukee & St. Paul could run a train between Chicago and St. Paul, by compelling the Northwestern to haul it for a hundred miles. Indeed, any railroad could run its trains to any place with which it had railroad connections, so long as it paid the regular price for hauling the cars. There would be this serious drawback, however, that its trains could not take any traffic on the line of the foreign road.

Because such a regulation might be oppressive where roads have had more independence does not prove that it is injurious where the whole railroad system has been made and planned with a knowledge of it, and therefore should have been adapted to it. Indeed, it is questionable whether it would not prevent the construction of many useless roads and the waste of much valuable capital and labor.

The Iowa Narrow-Gauge Company.

A company recently organized in Marshalltown, Iowa, sent a committee of directors to examine into the probability and advisability of constructing narrow-gauge railroads. The committee examined the two short railroads at Akron, O., constructed by Paul Brothers; visited the Baldwin Locomotive Works and obtained some information concerning narrow-gauge locomotives; inspected narrow-gauge cars constructed at Wilmington, Del., and visited the narrow-gauge roads at Toronto.

On their return they made a report, in which they make the usual arguments and the usual assumptions of the advocates of narrow-gauge roads, chief among which is the fallacy that the narrow-gauge roads are cheap *because* they are narrow, and not because they are light; and that a road of standard gauge *must* be costly and have large and heavy locomotives and cars.

They assume that a road of standard gauge cannot be constructed and equipped for less than \$30,000 per mile, in face of the fact that there are now in operation in the United States roads of that gauge, with heavy rails and rolling stock, whose whole capital account is very little if any more than \$20,000 per mile.

The Iowa Narrow-Gauge Company is wise in seeking for a method of making a cheap railroad sufficient for a light traffic. It is quite possible that it can construct a narrow-gauge railroad which will be both cheap and of sufficient capacity. So much we freely concede. But it makes a great mistake, and an unfortunate one,

as we believe, when it concludes that it is only by a narrow-gauge road that it can secure the objects desired. It is not, however, very surprising that it should come to such a conclusion. The only light and cheap roads its representatives saw were narrow-gauge lines, and they found abundance of information concerning cheap roads and rolling stock of narrow-gauge and none or next to none concerning similar roads of standard gauge. Our Iowa friends, we are confident, can gain all the advantages of the narrow-gauge and the further advantage of connections with the other railroads of the country by constructing a light road of standard gauge, and at the same or very nearly the same cost.

A SUMMER TRIP.

[Editorial Correspondence.]

WORCESTER, MASS., June 2, 1871.

During the early part of this week, before summer had commenced, somehow (I suppose by a mistake of the clerk of the weather who makes up in Washington the "probabilities") the temperature commenced to rise until the mercury indicated 95°. The effect upon the editorial goose-quill soon became apparent. It grew softer and softer, until its point became incapable of expressing any distinct thought. I therefore determined to take a little airing, run down among the Yankees, see what I could, and hear what they felt disposed to tell me. I took the New Haven Railroad, at 8 o'clock a. m., from New York, with a ticket for Boston, with the intention of visiting New Haven, Springfield and Worcester on the way. One object which I had in view was to visit the scientific schools which lay in my path; of these I will not speak now, but will have more to say in the future.

After the dust and heat of New York, and the struggling, money-getting life which is there lived so zealously, New Haven seemed a very Paradise of delight. The long avenues of elms, with their spring coronation robes as yet unsoiled or unfaded, the fresh grass and the exuberant life of the students at Yale, were all exceedingly grateful to a somewhat jaded New-Yorker.

My first call was on Professor Trowbridge, of the Sheffield Scientific School; but what he told and showed me I will recite in a future number.

THE NEW YORK & NEW HAVEN SHOPS.

I then visited the shops of the New York & New Haven Railroad, over which Mr. Kittendorf presides. I found him and his men occupying new quarters since my last visit, nearly two years ago. The intention of this company of building new shops was somewhat hastened by the destruction by fire of the old ones. Those they now occupy are all new, and consist of a round-house with 39 stalls: machine shop, 250 feet long by 65 wide; blacksmith shop, 203 feet by 50; car shop, 250 by 85; paint shop, 100 feet by 80, to which the company propose to make an addition, so as to give more room. All these buildings are built of brick, and have iron-trussed roofs. The tools in the machine shop were nearly all made by Bement, of Philadelphia, and are of his usual patterns.

In addition to the buildings described, they have a boiler-shop 40 by 75 feet, an iron store-house, built entirely of corrugated iron, an oil-house and a tank-house for supplying engines with water. The oil-house is 45 feet by 20, and is divided into three apartments. One is for oil, and in it there are three tanks with a capacity of 800 gallons each, and two of 500 each. They are planked below the floor, and are each provided with a pump for raising the oil as it is needed. The new waste is stored in the middle apartment, and the old or greasy waste in the one adjoining. The rooms are separated by solid walls, and the whole building is fire-proof.

The blacksmith shop is provided with two steam hammers, built by Bement. Mr. Kittendorf has also fitted a steam cylinder to an old punch and shear which had been thrown aside. With this addition he has made a very efficient tool out of an old machine which, without it, was almost useless. He is building a new locomotive which will have 17 by 22 inch cylinders, and which, in its general design, will be very similar to a Rogers engine.

The car department of this road is under the direction of Mr. M. L. Andrews. He is building some new passenger cars, and is now putting up the frame of a director's car. He has also an iron freight car nearly completed, which was designed and patented by Dr. Lamoth, of New York. This is built upon a very novel plan, the framing consisting of gas-pipe and steel-rods, united together in a very ingenious way. One of these cars is now running on the road, but this second one is intended to be an improvement on the first. Its weight, after its completion, will furnish the best test of the value of the plan. If its weight is con-

siderably less, in proportion to the load it carries, than that of ordinary cars, it will be a strong argument in its favor.

Mr. Andrews is also using an ingenious contrivance for opening the windows in the raised roof of his cars. One-half of the number of windows on each side open in one direction, and the other half in the opposite way. This is all done by one lever, and it is so arranged that the windows can be moved any desired distance. By this means a smaller or larger opening can be provided for ventilation as may be required by the weather, or the number of passengers in the car.

Mr. Andrews has also designed a passenger-car truck which possesses some novelty, and is said to ride easier than others on his road. We may give an engraving of this at some future time.

Both the machine and car shops of this road have an appearance of neatness and cleanliness which indicates good management, and present a favorable contrast to some of those which we visit, where apparently there is no place for anything, and where everything seems to be where it does not belong. The shops are located next to the water, and we could not help thinking that some of the homesick New Englanders in the Western States would have been wonderfully revived by the salt breeze which circulated through every part of the establishment on the warm day of our visit.

NEW HAVEN & NORTHAMPTON RAILROAD SHOPS.

This company have also favored their employees and their own interests by building new shops in New Haven. They have a half-round house with 14 stalls, a machine shop 120 feet by 65, blacksmith shop 40 by 75, car shop 100 by 85, oil house, etc. The shops have all raised roofs in the center with side lights, which is such a good arrangement that I wonder it is not universally adopted for all kinds of workshops. It gives a good light in the center of the building, with vertical windows from which there is no danger of leakage; it also gives height and space enough to carry off smoke, and in hot weather furnishes the very best means of ventilation.

The tools in the machine shop are nearly all of Bement's make, and those in the car shop by Richards & Thorne, of Philadelphia. The engines used on this road are all built by the Rogers Works. Two of them are heavy Mogul engines, a plan which seems to be gaining in favor on the Eastern roads. Mr. Henry Fox is the Master Mechanic on this road.

NEW HAVEN CAR COMPANY.

I made a hasty visit to the shops of this company, but was unfortunate in not finding the Superintendent at home. Their men are at work on cars for the New York & Oswego Midland, the Derby, the Portland & Ogdensburg, and Sheboygan Valley roads.

SPRINGFIELD.

From New Haven I went to Springfield, and what with the good cheer of the Massasoit House, the polite reception from Mr. Eddy and Mr. Adams, I at once felt at home, notwithstanding the thermometer was up in the minutes.

In the machinery department of the Boston & Albany road, and in the practice of Mr. Eddy, there is much to interest any railroad engineer or mechanic. In many respects his plan of locomotives differs from that of all other master locomotive builders in this country. All the locomotives which he builds are made without domes, the steam being taken into the cylinder by a perforated pipe. This pipe extends horizontally from the smoke arch to the back end of the boiler, and has holes about 3-16 of an inch in diameter drilled in its top along the whole length, excepting for a distance of about 3 feet from the smoke-box. The holes increase towards the back end so as to equalize the flow of steam into the pipe over the whole surface of the water. Mr. Eddy has built, and now has running, quite a large number of engines of this design, and after long experience with them is still very decided in his opinion that they give better results than locomotives with one or two domes. In this opinion he now stands almost alone; but knowing that majorities are very often wrong and minorities right, it would be unwise and unjust to decide that because in this opinion he is in a minority that *therefore* it is a mistaken one. I hope at some future time to have an opportunity of seeing the practical working of these engines by taking a ride on one of them.

His arrangement of the frames and fire-boxes also differs materially from any of the plans in common use. On 4-foot 8½-inch-gauge track, to get in a frame three or four inches wide it is necessary to contract the width of the fire-box to about 42 or 43 inches. As the barrel of the boiler is ordinarily from 46 to 48 inches in diameter, the fire-box must be made narrower than the barrel. Instead of making the frames of one piece and of uniform width through their whole length,

Mr. Eddy makes each of the jaws which receive the driving-boxes in a separate piece, and then bolts them to a flat bar of iron about $1\frac{1}{4}$ inches thick by 8 inches wide, which extends from the one jaw to the other. This allows the fire-box to be from $3\frac{1}{2}$ to $5\frac{1}{2}$ inches wider than it can be when the frames are made the full width through their whole length. This increases the area of grate service from 10 to 15 per cent., an advantage which is well worth making some sacrifice to secure, or which would compensate for considerable inconvenience which might be incurred in other directions. In widening the fire-box the difficulty which is encountered is, that it interferes with the springs, and they must either be placed below the driving-boxes or else be made of a different design. Mr. Eddy has placed them underneath, as is very common in English engines. We have heard many persons find fault with this arrangement, but if the only objection to widening the fire-box is that the springs must be located below the axles, it seems that any little inconvenience which may attend that practice would be much more than compensated for by an increase of 10 or 15 per cent. of grate surface. Probably the arrangement of these parts as designed by Mr. Eddy may not be the best possible; nevertheless, the advantage which he gains by getting a larger grate is at least worthy of being kept in view.

In attaching the frames to the boiler they are bolted rigidly to the fire-box, and not to the smoke-box, so that all the expansion is forward instead of backward. The boilers are double riveted on the circular seams, and single riveted on the horizontal, a practice which is just the reverse of that of all other master mechanics, and for which there does not seem to be any good reason. Inasmuch as the longitudinal seams must sustain a much greater strain from the steam pressure than the circular ones, and also considering the frequency of boiler explosions, it would seem to be advisable to double-rivet those parts which must resist the greatest strain.

The pumps on these engines are located underneath the foot-board, and are driven by eccentrics on the back driving-axle.

The steam chests are also quite peculiar in their construction. The valve-face is made to bolt to the cylinder. The chest is all made in one piece, excepting the outer side, which is left open. This has a cover which bolts to the top of the chest, and to the movable valve-seat. In order to examine the valve, therefore, it is necessary to take off the side instead of the top.

The Boston & Albany Company have just completed a new round house at West Springfield, which is across the Connecticut River from their present shops. It has 40 stalls, a large number of which were occupied with engines, and all of them built at the company's shops. They have also built a house expressly for the use of engineers, firemen and conductors. It has four rooms, one for each class of men. It is gratifying to see the increased attention which is paid to the comfort of railroad men, and doubtless the companies will be very much the gainers by every reasonable outlay made in this direction.

THE BOSTON & ALBANY CAR SHOPS.

This department is under the management of Mr. F. B. Adams. He is building passenger cars at the rate of one per month, and baggage cars as they are needed. The passenger cars are made 54 feet long over the body, and 9 feet 10 inches wide, with four-wheeled trucks. They are made with 8 longitudinal sills, those outside $5\frac{1}{2}$ by 8 inches and those inside 4 by 7 inches. The flooring is made of two courses of $1\frac{1}{2}$ inch stuff, with tarred paper between. The first course is of oak, the second of yellow pine. The outside of the cars is finished very plainly, with the joints of firing covered with iron straps. The inside is beautifully finished with a variety of woods, some of it California red-wood, which in combination with some others of dark color make as beautiful a contrast as I have ever seen in this kind of work.

Mr. Adams is also putting openings over the front and back windows for ventilation, an arrangement which will give very good results if it is only properly attended to.

In the construction of freight cars he has made some changes from ordinary practice. He puts the outside boarding horizontal instead of vertical. One reason for this is, that on taking out and replacing a sill only a few of the boards will be spoiled by nail holes, whereas when all the boards are vertical and nailed to the bottom sill, many of them are spoiled by drawing the nails. He is also of the opinion that horizontal boarding gives greater strength to the framing. The doors are made of ceiling with rails fastened on the inside by clinch nails, and without any framing.

Mr. Adams showed a model of a truck, which was

nearly completed, and which he expects to exhibit at the Car Builders' Convention. One novel feature in its construction is that all the iron work is put together with thin india-rubber cloth between. This, he thinks, will give a better bearing to the parts and to a great extent prevent the bolts and nuts from working loose.

I was glad to hear from Mr. Adams that the prospects of the Convention of Car Builders in Richmond are so good. It is expected that there will be a large meeting and a very full representation of members from the South.

WORCESTER.

In Worcester there is but one railroad shop—that of the Worcester & Nashua Railroad. Mr. G. H. Griggs is Master Mechanic. I had but a very short time to spend here, but in that time had an opportunity to examine Mr. Griggs' invention for burning sparks, which is certainly very novel, and which, according to his accounts, produces very remarkable results in the economy of fuel. It consists of a bell-mouthed pipe placed inside the stack in the position usually occupied by the deflector. This pipe extends from the top of the stack backward to the top of the boiler in front of the cab. Thence it branches down on each side of the boiler and connects with openings in the fire-box. By this means, all the sparks which are collected by the bell-mouthed pipe are carried back into the fire-box and have a second chance of being consumed. It is difficult to describe the arrangement clearly without a drawing, which I hope to give in the future. That very large quantities of fuel do pass out of the stacks unconsumed, there can be no doubt, and therefore I am not surprised to hear of a very large saving of fuel resulting from the use of this invention.

Mr. Griggs has also exercised his ingenuity in designing a passenger-car truck. The peculiarity of it is that the swing-beam is prevented from striking against the cross-pieces of the truck by having rubber springs between it and them. This prevents the jar caused by the one striking against the other. I am a little doubtful, however, whether the advantage thus gained will justify the additional expense. The most effective means of making cars "ride" easy is the improvement of the road-bed and track, and I have never yet seen a truck which would make a car move smoothly on a rough track.

OSGOOD BRADLEY'S CAR WORKS.

About 120 men are employed in this establishment, which is said to be the oldest in the country. They have the following work in progress: Two drawing-room cars for Wagner's New York & Boston line, each $45\frac{1}{2}$ feet long by $9\frac{1}{2}$ feet wide; six passenger cars for the Burlington & Missouri River Railroad of Nebraska; three for the Buffalo & Washington road, $49\frac{1}{2}$ feet long by 10 feet wide; two for the Boston & Providence; two for the Portland & Ogdensburg; six twelve-wheeled cars for the Maine Central, to be 56 feet long by $9\frac{1}{2}$ wide, and to seat 73 passengers each; two twelve-wheeled passenger cars, 200 freight, 100 dump and 100 flat cars for the Boston, Clinton & Fitchburg road; two passenger, one baggage, 10 box, 10 flat and 10 dump-cars for the Boston, Barre & Gardiner road, and one baggage and ten box cars for the Buffalo & Washington road.

The Master Car Builders.

The annual convention of the Master Car Builders' Association commenced its session in Richmond, Va., last Wednesday. After a long discussion it was voted that the draw-bars of freight and passenger cars should be fixed at the uniform height of two feet nine inches. The next annual meeting is to be held in St. Louis. We expect to give a full report of the proceedings in the next number of the RAILROAD GAZETTE.

—The San Francisco *Bulletin* wants it understood that San Francisco is not in a tremble over the prospect of a diversion of the China trade to the future cities of Puget Sound. The *Bulletin* says: "We are told, now and then, that the route from Puget Sound to China is some hundreds of miles shorter than from San Francisco to China; and that Oriental commerce will be diverted to the new route via Puget Sound. All this looks well on paper. But the shorter route is not one of controlling influence. Boston is nearer Southampton than New York. But this fact does not concentrate the steamship lines at the former place. It happens, also, that the China line is no longer following extreme northern parallels; the disadvantages of rough weather have been found to more than offset the advantage of the fewer miles to be traversed. It is well, also, to note the fact that San Francisco will probably be the terminal of not less than three continental railroads, and that the combined influence of these railroads will be far greater than that of the Northern Pacific."

—The Wellington, Grey & Bruce (Canada) Railway Company have voted \$8,000 to Mr. Adam Brown, as an acknowledgement of his services to the enterprise.

REGISTER OF EARNINGS.

FOR THE MONTH OF MAY.

Michigan Central (284 miles), 1871.....	\$454,91 63
" (284 miles), 1870.....	406,288 28
Increase (6% per cent.).....	\$27,808 35
Earnings from all sources.....	\$480,847 93
Chicago & Alton (511 miles), 1871.....	\$465,780 44
" (466 miles), 1870.....	408,685 64
Increase (14 per cent.).....	\$57,094 80
Central Pacific (89 miles), 1871.....	\$917,760 00
" (742 miles), 1870.....	768,730 00
Increase (19% per cent.).....	\$149,030 00
Marquette & Cincinnati (251 miles), 1871.....	\$119,650 00
" (251 miles), 1870.....	110,313 00
Increase (8% per cent.).....	\$9,437 00
Ohio & Mississippi (393 miles), 1870.....	\$246,266 00
" (393 miles), 1871.....	232,263 00
Decrease (9% per cent.).....	\$24,003 00
Toledo, Wabash & Western (521 miles), 1871.....	\$453,090 00
" (521 miles), 1870.....	340,892 00
Increase (33 per cent.).....	\$112,197 00
FOR THE FIRST WEEK IN JUNE.	
Chicago & Alton (511 miles), 1871.....	\$104,378 67
" (466 miles), 1870.....	95,870 85
Increase (9% per cent.).....	\$9,008 82
FOR YEAR ENDING MAY 31.	
Michigan Central (284 miles), 1871.....	\$4,978,070 15
" (284 miles), 1870.....	4,707,287 97
Increase (5% per cent.).....	\$270,782 18
Earnings from all sources.....	\$5,430,123 39

Pacific Mail Steamship Company.

The current statement of the company's affairs show the assets and liabilities as of May 1st, 1871, as follows:

ASSETS.	
Cash on hand and call loans.....	\$275,360 73
Time loans.....	242,999 06
Cash in hand of agents and purveyors.....	55,100 21
\$95,000 U. S. 5-20 bonds cost.....	981,069 35
\$ 75,000 U. S. bonds cost.....	888,025 00
	\$2,491,552 35
27,149 shares P. M. S. S. Co. stock (being also a liability for the same amount).....	2,714,901 00
1,668 shares California Dry Dock Co. San Francisco.....	100,325 99
42,449 tons coal.....	619,622 94
Outfits and supplies.....	282,830 23
Real Estate:	
San Francisco, including wharf and franchise.....	681,610 60
Warehouses, San Francisco.....	139,230 78
Benicia.....	25,041 41
Oregon.....	2,397 75
San Diego.....	1,215 00
Hong Kong, with wharf, storehouses, etc.....	170,941 79
Yokohama, with storehouses and coal-sheds.....	62,317 97
Hogo.....	991 34
Tahoga water works, etc.....	40,000 00
Islands (Bay of Panama).....	25,000 00
Aspinwall iron wharf, house, warehouse, etc.....	580,677 94
Canal street wharf.....	25,000 00
	1,778,211 58
Steamers, 20 in number, plying on the Atlantic and Pacific oceans.....	11,843,534 60
Lighters.....	103,122 60
Unsettled accounts with connecting companies, etc.....	47,674 20
Balance to debit of profit and loss.....	78,934 63
	\$20,060,709 12
LIABILITIES.	
Capital stock.....	\$20,000,000 00
Freight on coals in transitu.....	50,939 92
Unsettled accounts with connecting companies.....	9,719 20
	\$20,060,709 12

The auditing committee, Messrs. Jas. M. Brown, Wm. Dennistoun, Francis Skiddy and Allan McLane, having made examination of the company's books, accounts, assets and securities, find them (May 18) all in order, and correct, in accordance with the above statement.

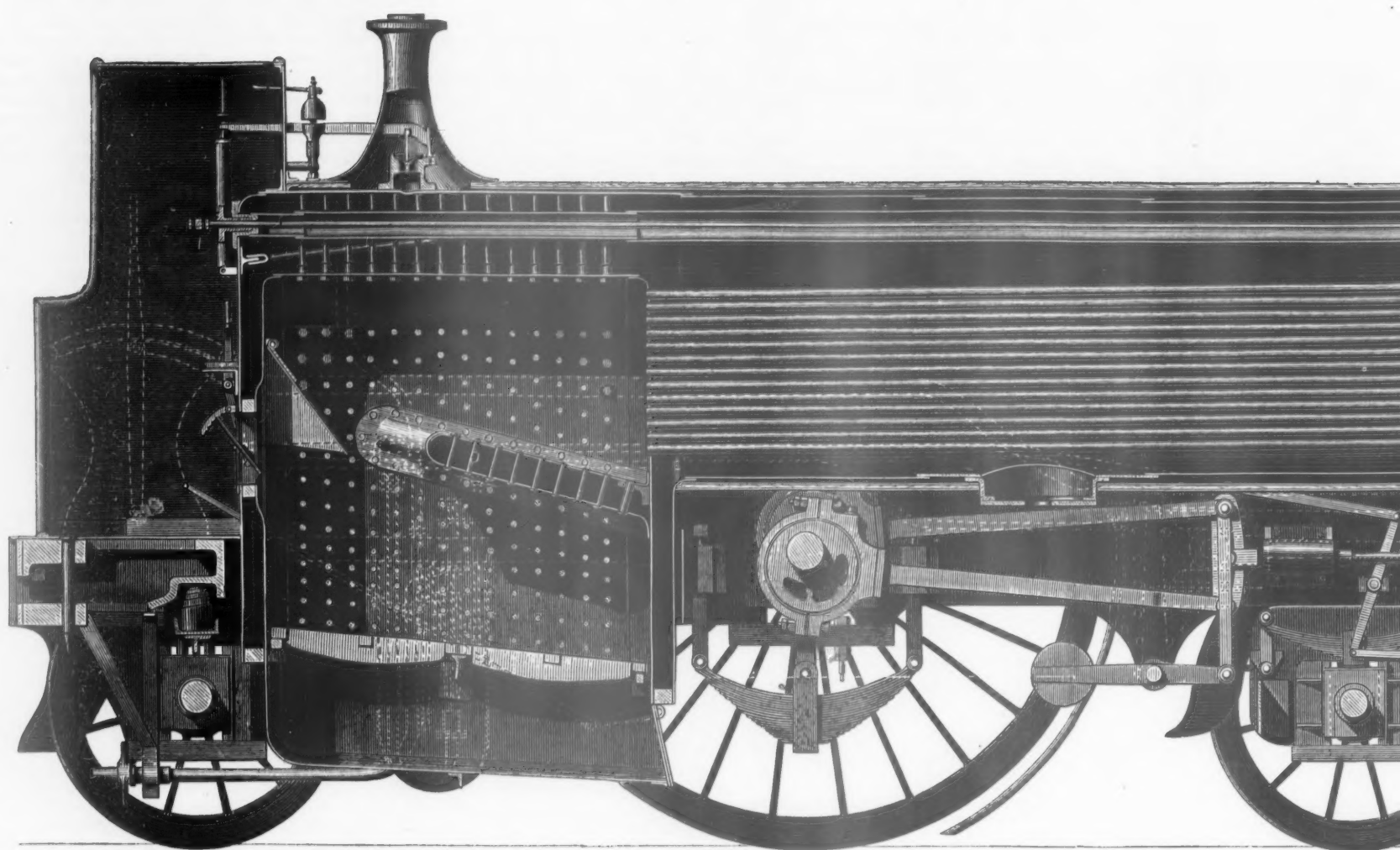
Railroad Statistics of the World.

The *British Trade Journal* for May, 1871, furnishes the following statistics of the total sums expended in the various civilized countries of the world in railroad enterprises: In the United Kingdom, £502,262,887; United States, \$408,245,154; France, \$315,322,978; Russia, £289,671,243; Prussia, £149,537,869; British India, £78,377,748; Italy, £76,516,154; Spain, £73,487,585; Austria, £65,474,000; South Germany, £46,982,856; Belgium, £36,439,772; Canada, £33,000,000; North Germany, £23,421,540; and the rest less and less—Greece having spent only £1,000,000; Turkey, £2,987,810, and Egypt, £9,032,776. But the subjoined table contains a valuable bird's-eye view of significant and important details:

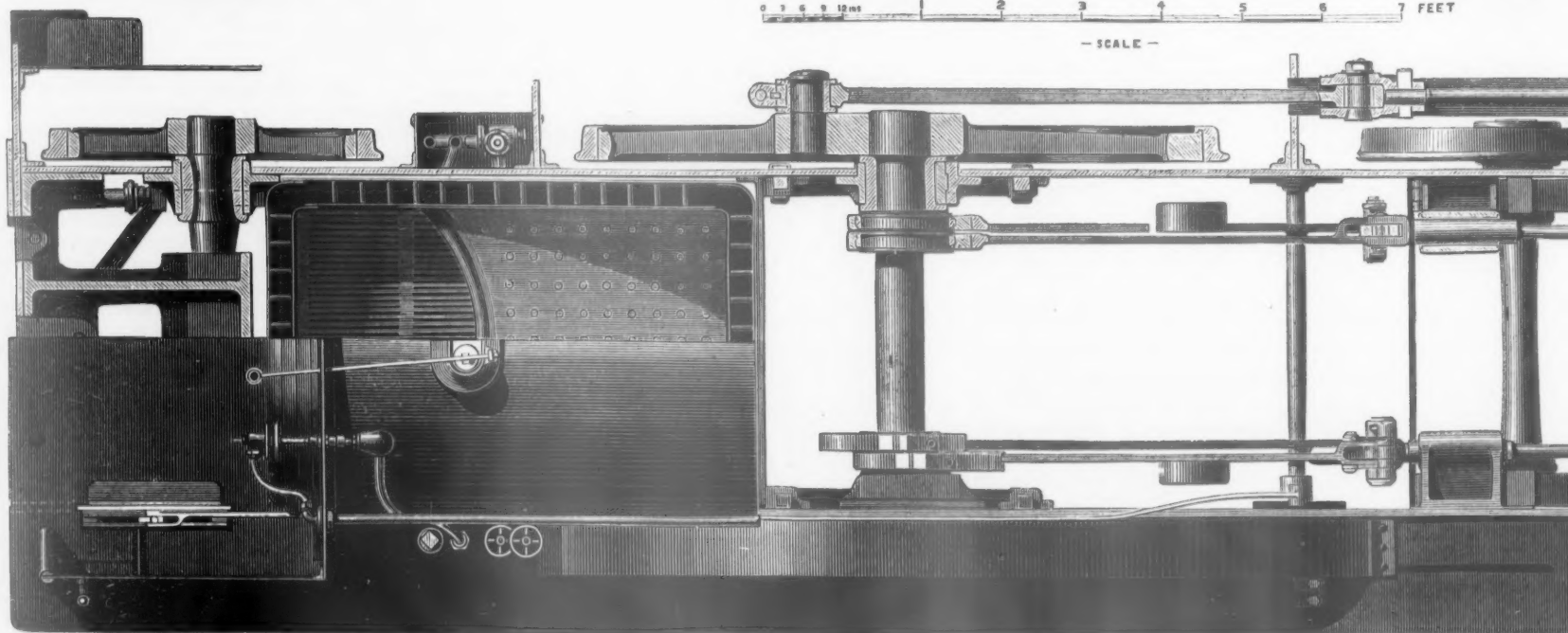
	Area in square miles.	Population.	Miles of railway.	Cost per mile.
North America.....	4,177,204	50,591,606	40,801	\$2,104
West India Islands.....	53,528	1,806,538	445	10,070
South America.....	5,979,411	21,040,997	1,421	23,267
Europe.....	3,651,33	284,212,055	61,048	27,140
Asia.....	2,978,2 0	221,250, 0	4,074	18,562
Africa.....	532,000	5,450,000	583	1,847
Australia.....	1,578, 00	1,523,751	789	19,607

The *Trade Journal* remarks: "We are unable to explain the marked contrast between the expense of constructing the North and South American iron highways."

One explanation is that the cost of materials and skilled labor is greater in South America, and another that a large number of its lines are in a mountainous country, with exceedingly heavy work; a third, that most have been constructed by English engineers in the English style, which is very costly, and a fourth that a large margin has been left for the contractor's profits.



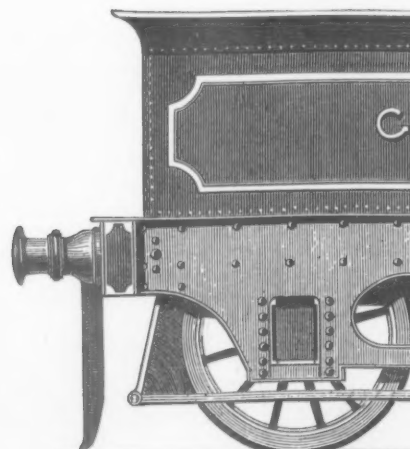
0 1 2 3 4 5 6 7 FEET
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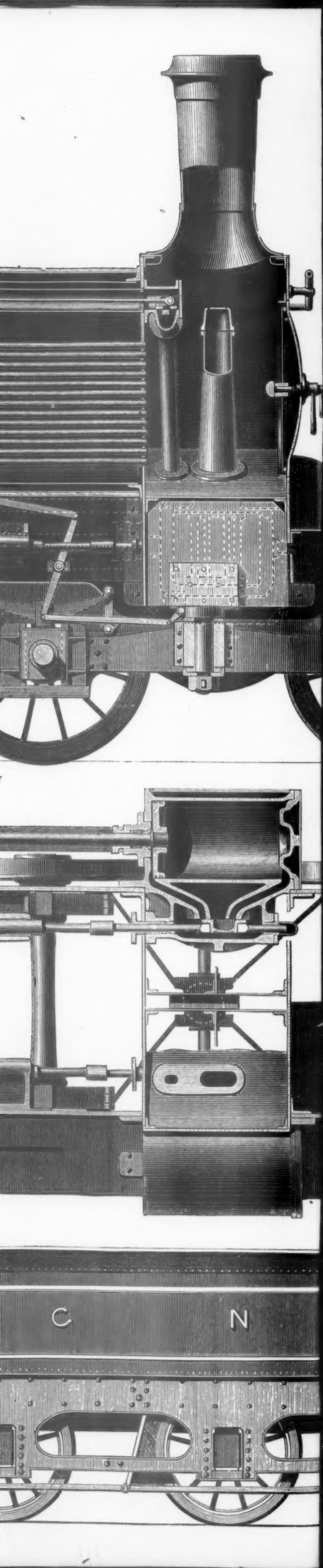


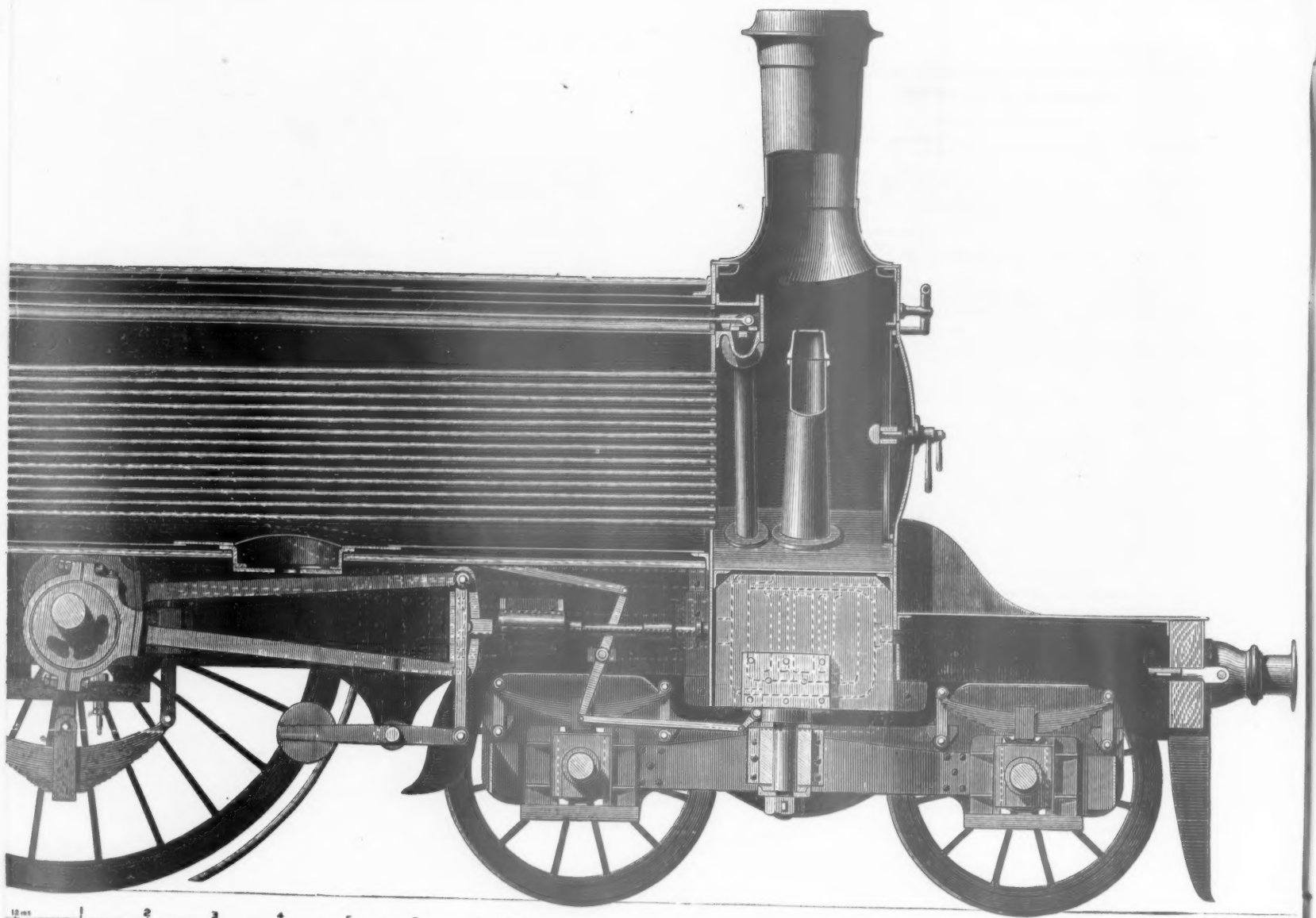
J. TIMBAULT.

DIMENSIONS.

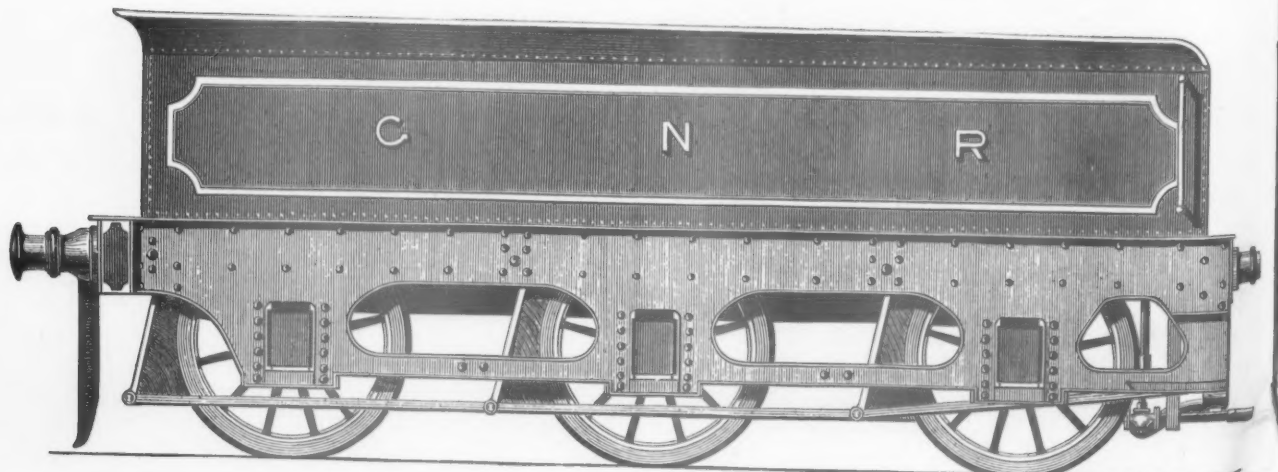
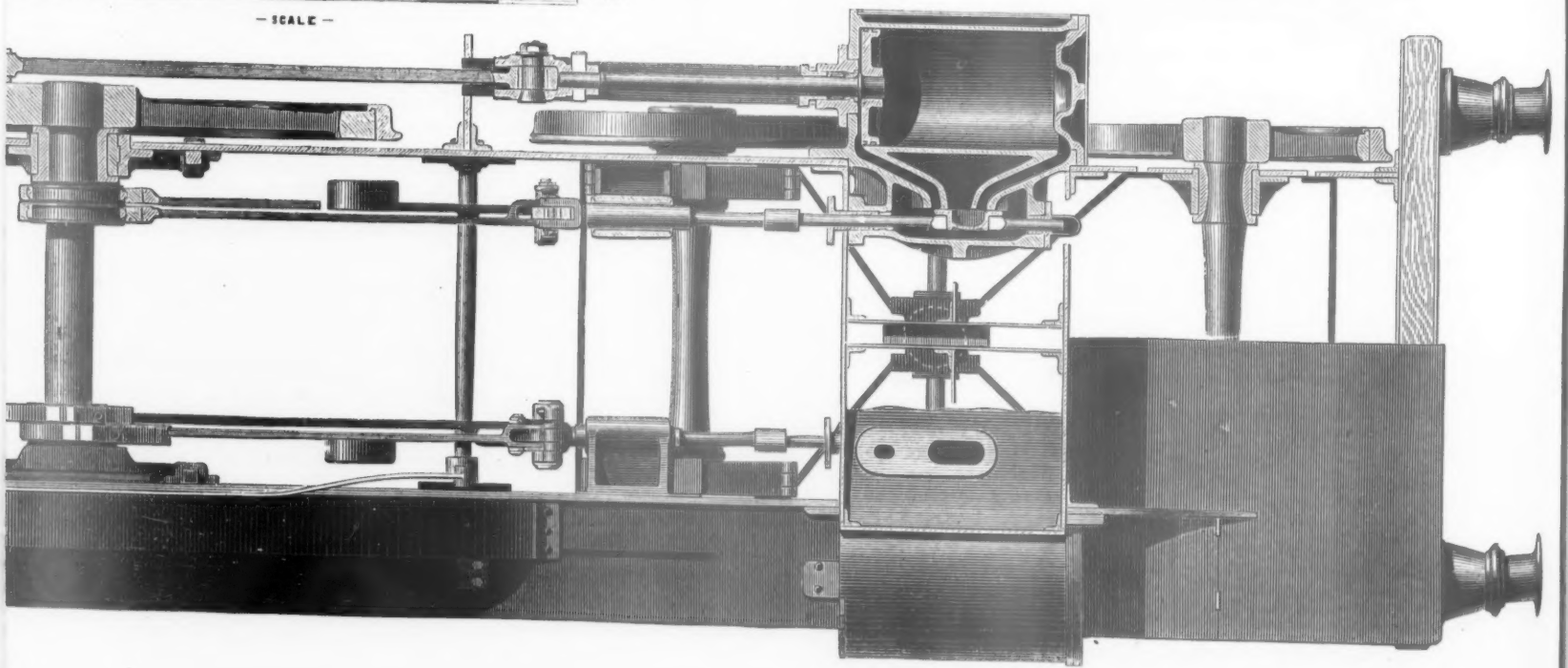
WEIGHT ON DRIVERS.....	15 tons.
TOTAL WEIGHT.....	88 tons, 9 cwt.
DIAMETER OF BOILER, OUTSIDE LARGEST PLATE.....	4 ft., ½ in.
LENGTH OF BOILER.....	11 ft., 5 in.
CYLINDERS, 18 INCHES IN DIAMETER AND 28 INCHES STROKE.	
DIAMETER OF DRIVERS.....	8 ft., 1 in.
DIAMETER OF TRUCK WHEELS.....	3 ft., 11 in.
DIAMETER OF TRAILING WHEELS.....	4 ft., 1 in.



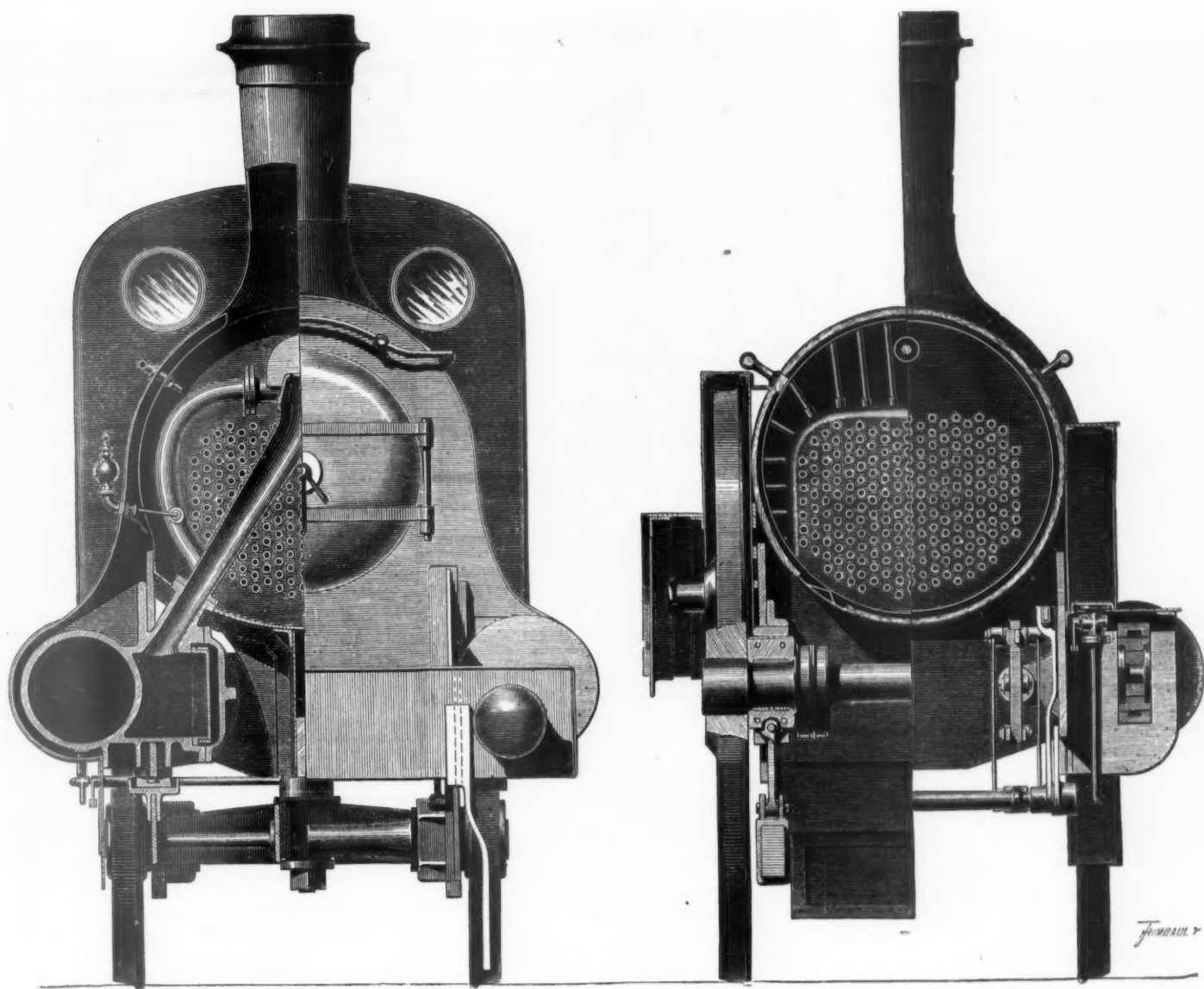




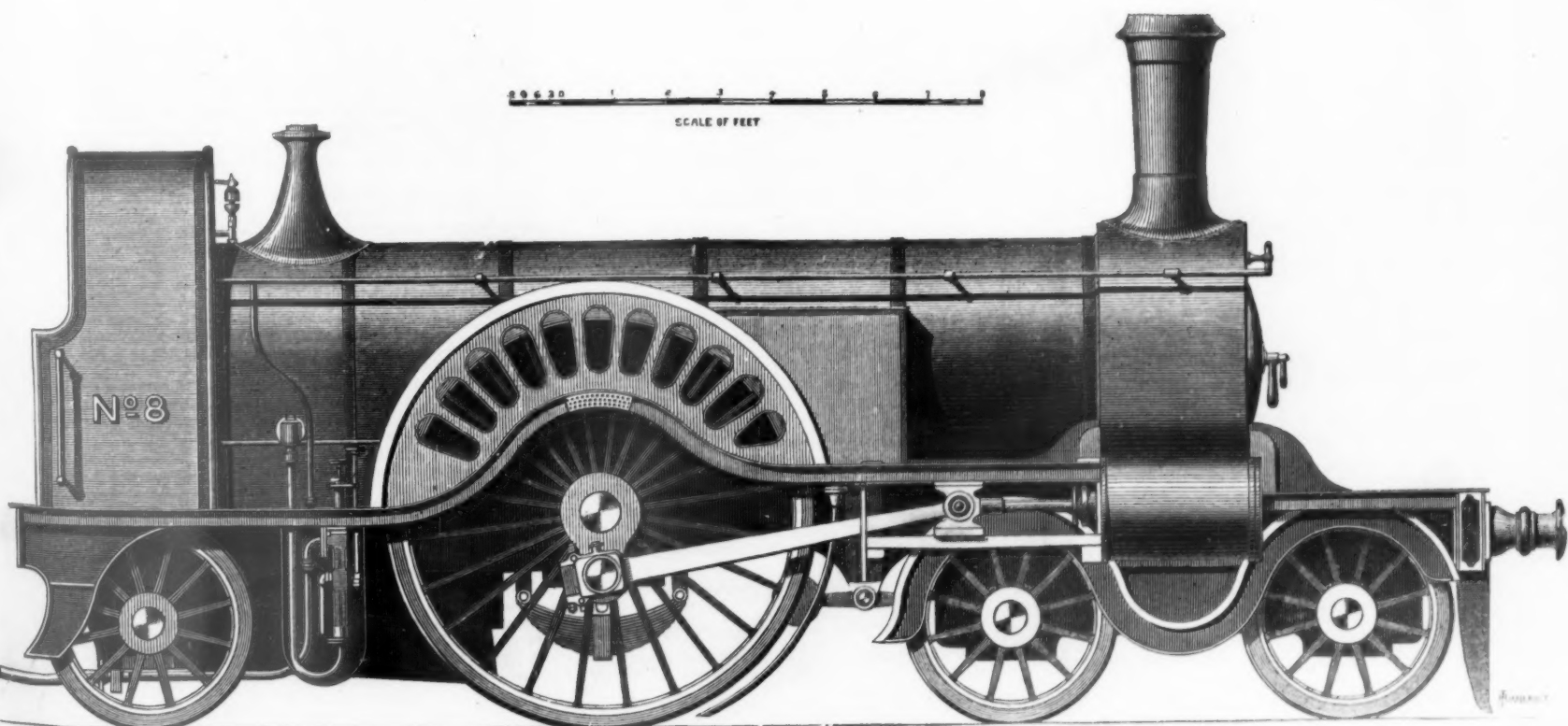
12 in. 1 2 3 4 5 6 7 FEET
— SCALE —



... 15 tons.
33 tons, 9 cwt.
... 4 ft., 1/2 in.
... 11 ft., 5 in.
... 8 ft., 1 in.
... 3 ft., 11 in.
... 4 ft., 1 in.



ENGLISH EXPRESS LOCOMOTIVE,
CONSTRUCTED BY THE
 GREAT NORTHERN RAILWAY COMPANY,
 From Designs of Patrick Stirling, Locomotive Superintendent.
[For Description, see Page 137.]





AN ENGLISH EXPRESS LOCOMOTIVE.

We republish in another part of this paper *Engineering's* very elaborate engravings of an express passenger locomotive of the Great Northern Railway, designed by Mr. Patrick Stirling, Locomotive Superintendent, of which the following is *Engineering's* description :

The Great Northern Railway is so noted for its heavy and fast passenger trains, that the engines employed to work those trains have a special interest for locomotive engineers. The express traffic of the Great Northern line necessitates the running of trains consisting of from 15 to 26 carriages from King's Cross to Peterborough at a mean speed of 47 miles per hour, these trains having to be taken up gradients of 1 in 105 and 1 in 110 through the Maiden Lane and Copenhagen tunnels, and there being, moreover, an almost constant rising gradient of 1 in 200 to Potter's Bar, a distance of 13 miles. Such traffic, of course, necessitates the employment of very powerful engines, and about two years and a half ago (*vide* page 324 of our sixth volume) we illustrated and described the express passenger locomotives designed by Mr. Patrick Stirling, for working the trains then run. These engines have 7 feet driving-wheels and inside cylinders 17 inches in diameter with 24 inch stroke, the tractive force they are capable of exerting being thus 82.57 lbs. for each pound of effective pressure per square inch on the pistons. With the increase of traffic these engines have been found somewhat deficient in cylinder power, and Mr. Stirling resolved, therefore, to construct locomotives of a still more powerful class, having cylinders larger than those of any existing passenger engines. The result of this determination was the construction of the engine which we illustrate this week by our two-page engraving, and by the engravings on pages 134 and 135, an engine which during the past eight months has run 32,000 miles with express trains, and has given so much satisfaction that several more of the same class are now being built at the company's works at Doncaster. This engine has outside cylinders 18 inches in diameter, with 28 inch stroke, and the driving-wheels are 8 feet 1 inch in diameter. Taking the diameter of the driving-wheels with the tires half worn, as 8-feet, the tractive force which the engine is capable of exerting, will be:

$$\frac{18^2 \times 28}{84} = \frac{324 \times 28}{84} = 108 \text{ lbs.}$$

for each pound of effective pressure per square inch on the pistons, an amount nearly one-third greater than that of the engines formerly described by us. The stroke, namely, 28 in., is longer than that of any passenger locomotives with which we are acquainted, and this length of stroke enables a high speed of piston to be maintained, notwithstanding the large size of the driving wheels. In fact, when the engine we are describing is running at a speed of 60 miles per hour, the piston speed is as great as that of the 7-foot-wheel engines, of which we formerly gave an account, when running at a speed of 61½ miles per hour.

The boiler, which is worked at a pressure of 140 lbs. per square inch, is double riveted at the longitudinal, and single riveted at the circumferential seams, all the joints being lap joints. The crown of the fire-box is stayed by $\frac{3}{8}$ inch round stays screwed into both the fire-box top and outer casing, and riveted over on the outside, the fire-box crown being slightly rounded, as shown in the transverse section on page 134. We are very glad to see this method of staying fire-box crowns coming into extensive use. It has long been used in Belgium, and elsewhere on the Continent, in connection with a flat-topped fire-box casing; it has been adopted in a number of instances in America, and it has been for some time extensively employed on the Northeastern Railway, while Mr. Stirling informs us that he has nearly 100 boilers now running stayed in this manner, and that it is found that they give every satisfaction. The general evidence of those who have adopted this mode of staying, is to the effect that it prevents the distortion of the tube holes, which is but too often caused in boilers worked at a high pressure, and with the fire-box crown stayed in the ordinary way, while the rounding of the fire-box crown also tends to prevent the lodging of deposit, and great facilities are afforded for cleaning. In the engine we are now describing, Mr. Stirling has substituted an inclined copper midfeather for the brick arch, as shown in the longitudinal section.

In the course of our former description of the Great Northern express engines, we mentioned that Mr. Stirling had obtained some very successful results with tubes much smaller than are generally employed, and we find that a more lengthened experience with such tubes has proved them to be well adapted for engines working under the conditions of the Great Northern traffic. Mr. Stirling now uses tubes but 1½ inches in diameter outside for all engines in which the length of the tubes does not exceed 10 feet 6 inches; but in the case of the locomotive we illustrate, the length being nearly 12 feet, the tubes have been made 19-16 inches outside. One advantage of these small tubes is that they do not pass so much unconsumed fuel as those of larger diameter; and we believe that during last summer there was not a single case of fire being caused (except on the slopes) by engines on the Great Northern line.

As regards the working gear and general arrangement of the engine, little need be said here, as the details are clearly shown by our engravings. The general design of the engine is excellent, as will be seen on reference to the elevation on page 315, and the details are well worked out, all working parts being thoroughly accessible. The link motion is of the ordinary shifting-link kind, and the reversing quadrant is very minutely graduated, so as to enable full advantage to be taken of working expansively. The method of fixing the cylinders is worthy of notice. Each

cylinder, it will be seen, is held in an opening formed in the corresponding frame, this opening being closed below the cylinder by a stay made to clip the frame like a horn plate-stay where it is carried down at each end of the opening. The joint of each steam chest cover is on the center line of the valve-spindle, so that the valves can be readily removed, and the valve face is left fully exposed when the cover is taken off. The frames are well stayed at the cylinders by transverse plate-stays, as shown, the bottom of the smoke-box, which is $\frac{3}{8}$ inch thick, being connected to these stays by angle irons and a further stiffening being obtained by the foot-plate in front of the smoke-box. To the transverse plate-stays just mentioned are attached a pair of longitudinal plates $\frac{3}{8}$ inch thick, which carry the bogie pin, as shown in the plan and transverse section through the smoke-box, these longitudinal plates being stiffened by gusset pieces connecting them to the smoke-box bottom, as shown in the last mentioned view. The smoke-box, it will be noticed, is made with an inner casing—a plan which has been adopted on the Great Northern line for some time past.

The engine is carried at the leading end upon a four-wheeled bogie, the construction of which is clearly shown in our engravings, while the axle boxes of the trailing wheels have a lateral play of $\frac{3}{8}$ inch in the horn-plates. Besides the center pin, the bogie is provided with bearings at the sides under the cylinders, as shown in the transverse section through the smoke-box. The engine is found to traverse sharp curves, and pass into and out of sidings with great ease, and it is, moreover, found to be remarkably steady at high speeds. At the trailing end the engine is carried upon five volute springs; the arrangement of the other springs is clearly shown in our illustrations.

We have now, we think, pointed out the chief peculiarities of the engine we are describing—an engine, we may remark, that forms an excellent example of a modern express locomotive—and all we need do, therefore, is to add a list of the principal dimensions, which are as follows :

<i>Cylinders :</i>	<i>ft.</i>	<i>in.</i>
Diameter of cylinders.....	1	6
Stroke.....	2	6
Distance apart of cylinders from center to center.....	6	6
Distance from center line of cylinder to valve-face.....	1	2
Length of ports.....	0	1 2
Width of steam ports.....	0	3 1/2
Width of exhaust ports.....	0	1 3/4
Width of bars.....	0	1
Distance between centers of valve-splines.....	2	10
Lap of slide-valve.....	0	1 1/2
Travel of slide-valve in full gear.....	0	4 1/2
Distance from center line of exhaust ports to center of driving axle.....	11	0

<i>Working gear, etc.:</i>		
Diameter of piston rods.....	0	2%
Width of guide bars.....	0	5
Thickness of guide bars.....	0	2%
Distance apart of guide bars.....	1	0
Length of crosshead slides.....	1	0
Length of connecting rod between centers.....	6	11
Diameter of crank-pin bearing.....	0	4%
Length of crank-pin bearing.....	0	5
Diameter of cross-head pin bearing.....	0	3½
Length " " " ".....	0	3¼
Diameter of eccentrics.....	1	8
Width of eccentrics.....	0	2¾
Throw of eccentrics.....	0	2
Length of eccentric rods between centers.....	5	10
" " expansion links.....	2	3
" " lifting.....	1	0
" " arms.....	1	0
Distance from center of weighbar to center of driving axle.....	4	11½
Distance of center of weighbar below center line of cylinders.....	1	8
Distance of center line of valve-spindles below center line of cylinders.....	0	1
Length of valve-spindle guides.....	1	0
Diameter of the portions of valve-spindles working in guides.....	0	2½

<i>Wheels and Axles:</i>		
Diameter of driving wheels.....	8	1
" " bogie wheels.....	3	11
" " trailing ".....	4	1
Distance between centers of bogie wheels.....	6	6
Distance from center of front bogie wheels to bogie pln.....	3	6
Distance from center of hind bogie wheels to bogie pln.....	3	6
Distance from center of hind bogie wheels to center of driving wheels.....	7	9
Distance between centers of driving and trailing wheels.....	8	8
Total wheel base.....	22	11
Distance from center of driving axle to front of fire-box casing.....	1	10%
Distance from center of trailing axle to outside trail- ing buffer beams.....	2	6
Driving axle; diameter at wheel seats.....	0	9
" " " bearings.....	U	0
" " " centre.....	U	7%
" " " length of wheel seats.....	0	7
" " " bearings.....	0	8
Driving axle; distance between centers of bearings....	0	11
Trailing axle; diameter at wheel seats.....	0	5%
" " " centers of bearings.....	0	5%
" " " diameter at center.....	0	5%
" " " length of wheel seats.....	0	6
" " " bearings.....	0	10
" " " distance between centers of bearings.....	3	9
Bogie axles; diameter at wheel seats.....	0	0%
" " " centers of bearings.....	U	5
" " " length of wheel seats.....	0	5
" " " bearings.....	0	0
" " " distance between centers of bearings.....	3	2%
Width of driving and trailing-wheel tires.....	0	3%
" " bogie-wheel tires.....	0	5
Lateral play allowed to trailroag wheels.....	0	0

Lateral play allowed to trailing wheels.....	0	0%
<i>Frames:</i>		
Distance apart of main frames.....	4	0%
Thickness of main frames.....	6	1
Depth " " between driving and trailing horn-plates.....	1	9
Depth of main frames between driving horn-plates and cylinders.....	1	8%
Height of top of frame from rail at leading end.....	4	4
Total length of frames outside buffer beams.....	28	
Length of bogie frames.....	9	5%
Depth " " between horn-plates.....	0	11%
Depth of bogie diagonal frames at center.....	0	10
" " sides.....	0	4
Diameter of bogie pin.....	0	4
Width of ends outside foot-plate.....	7	5

<i>Boiler:</i>		
Length of barrel.....	11	8
Diameter of barrel outside smallest plate.....	3	10%
" " largest "	4	0%
Thickness of barrel-plates and fire-box casing-plates..	0	0%
Thickness of smoke-box tube plate.....	0	0%

<i>Boiler :</i>		<i>ft.</i>	<i>in.</i>
Length of fire-box casing (outside).....	6	3	
Width " " at bottom.....	3	11 1/2	
" " at center line of boiler.....	1	1 1/2	
Depth of fire-box casing below center line of boiler at front end.....	5	1	
Depth of fire-box casing below center line of boiler at trailing end.....	4	7	
Length of inside fire-box at top.....	5	5 3/4	
" " " " grate level.....	5	5	
Width " " " " " ".....	3	3	
Height " " " " at front.....	5	10 1/2	
" " " " back.....	5	4 1/2	
Thickness of fire-box tube-plate.....	0	0 3/4	
" " " " back-plate.....	0	0 3/4	
" " " " sides and crown.....	0	0 1/2	
Length of tubes between tube-plates.....	11	8	
Diameter of tubes (outside).....	0	19-10	
Number.....	217		
Height of centers of top row of tubes above centre line of boiler at the fire-box end.....	0	6 1/2	
Height of centers of top rows of tubes above centre line of boiler at smoke-box end.....	0	8	
Height of center line of boiler above rail level.....	7	1	
Height of top of chimney above rail level.....	13	4	
Length of smoke-box, inside.....	3	8 1/2	
Radius of top of smoke-box, inside.....	3	4 1/2	
Diameter of blast-nozzle.....	0	4 3/4	
Height " " above center line of boiler.....	1	4	
Diameter of chimney at bottom.....	1	3	
" " " " " ".....	1	6	
Height of chimney above top of smoke-box.....	3	10 1/2	
<i>Heating Surface :</i>		<i>square feet.</i>	
Tubes.....		1,043	
Fire-box.....		122	
Total.....		1,165	
Fire-grate area.....		17.6	
<i>Weight in working order :</i>		<i>tons.</i>	<i>cwt.</i>
On front bogie wheels.....	7	0	
" " " " " ".....	8	0	
" " driving wheels.....	15	0	
" " trailing " ".....	8	9	
Total.....		38	9
Weight of tender, loaded.....		26	10
Total length of engine and tender over buffers.....		50ft.	3in.

MECHANICS AND ENGINEERING.

The St. Joseph Bridge.

The contract for building this bridge, consisting of three fixed spans of 235 feet and a pivot draw of 445 feet total length, was, on the 10th inst., awarded to the Detroit Bridge & Iron Company. Their bid was \$710,000 for the bridge complete, including the substructure. The bid of the American Bridge Company was \$714,000, with the provision that if pneumatic tubes—such as are used in the Leavenworth and Omaha bridges—were used, instead of masonry, the contract would be taken at \$610,000.

What was most remarkable in the bidding was the closeness of the estimates of the several bidders for the 445 feet draw, which will be 60 feet longer than any draw ever constructed in this country. The bids for this portion of the work were as follows:

American Bridge Company.....	\$136,700
Detroit Bridge & Iron Works.....	132,000
Baltimore Bridge Company.....	128,000
Clarke, Reeves & Company.....	132,600

The Detroit company had a considerable advantage in making a low bid, owing to the fact that they had boats and machinery near at hand, having just completed the substructure of the Hannibal Bridge.

Locomotive of Convertible Gauge.

A Canadian exchange says that the Canadian Engine and Machinery Company, at Kingston, has lately turned out the first of a contract of fifteen locomotives for the Intercolonial Railway. The locomotive is built on the broad gauge, but can be converted, by a new principle, into the 4-feet 8½-inch gauge.

Prices of Rails in May.

Bigelow & Johnston, of No. 48 Pine street, New York, report as follows the prices and importations of rails in May :

	Gold.	Currency.	Imports, tons.
<i>New Rails :</i>			
English.....	\$85@ \$86½		21,915
American.....		\$69 @ \$70	
Total import this month...			21,915
Import since January 1....			38,316
Total to date.....			52,536
Same time, 1870.....			38,884
<i>Old Rails :</i>			
Double heads.....	\$89½ @ 40		
T or flange.....	39		
U or bridge.....	Nominal.		5,070
Total import this month...			5,070
Import since January 1....			11,067
Total to date.....			16,127
Same time, 1870.....			24,821

New Rails.—The improved feeling noted in our last circular has continued during this month, and the business accomplished has been considerable, though the market is notably free from excitement.

Prices on spot for leading brands of Welsh rails remain about the same as a month ago ; but for delivery during late summer and fall, it is difficult to get quotations except at an advance over present prices.

The English manufacturers are leaning greatly on the demand from the United States, the customary Russian orders having so far been below expectations. Should these latter become more plentiful there would ensue a decided rise in prices.

American mills are getting a better share of the orders, though we should like to see some improvement in price.

Old Rails.—There has been a better supply during the month, though not more than equal to the demand. Even at our full quotations the margin to importers is slender, and there seems to be little probability of its being soon increased.

—Mr. Edward Wilder, Land Commissioner, reports that the sales of Hannibal & St. Joseph Railroad land in North Missouri for the month of May were, to 28 purchasers, 119,300 acres, and 5 town lots for \$14,221.72, or an average of \$11.92 4-10 per acre.

General Railroad News.

CHICAGO RAILROAD NEWS.

Closing of the Canal.

Mr. Wm. A. Gooding, General Superintendent of the Illinois & Michigan Canal, publishes a notice that this canal will be closed for navigation for ten days, beginning with the 25th inst., for the purpose of removing Summit locks 1 and 2, in accordance with the plan of deepening the canal, by which the current of the Chicago River is to be reversed and the water of Lake Michigan made to flow into the Illinois.

A California Car.

A drawing-room and sleeping-car, built by the Kimball Manufacturing Company, at San Francisco, has been on exhibition at the Union Depot in this city during one or two days of this week, and attracted considerable attention from those interested in car building, as well as those more generally interested in wood-work. The car is furnished with the latest and best improvements, the Baker heater and ventilator and the Miller platform, and consists entirely of compartments, a state-room at each end, and two separate rooms in the middle with a passage way around. Each room is provided with separate closets and toilet appliances.

The woods used in the construction of the car are all native to the Pacific coast, and give evidence that good taste can be gratified and the finest effect secured without the use of imported material. The body of the wood used in finishing the interior is California laurel, with panels of Oregon and California maple, mesquit, rosewood, and root of redwood.

There is notably an absence of ornamentation where ornament is usually bestowed. On entering the car, the effect is not dazzling, and perhaps a simple-minded heathen would not be "struck" by it, but longer inspection—such inspection as the traveler has abundant leisure for—discovers perfect good taste and harmony in the arrangement of everything.

The car leaves this city for Washington, whence it is, we understand, to convey the President and his party to the Pacific coast.

Chicago & Northwestern.

On Tuesday of this week, Mr. John C. Gault, with a party of the directors of the company, left this city by special train, the officers' car and a sleeping car, for Minnesota, by way of Milwaukee, the Milwaukee & St. Paul and the Winona Cut-off to Winona, and from there to Mankato and St. Peter over the Winona & St. Peter road. Returning, the party expect to arrive in Madison to-night.

In another column may be found the list of newly elected directors of the La Crosse, Trempealeau & Prescott (Winona Cut-off), Winona & St. Peter, and Chicago & Milwaukee companies. It will be seen that Mr. Kirkman, the General Accountant, and Mr. Wheeler, General Freight Agent of the Northwestern, have been made directors of the first-named company, and Mr. Redfield, Assistant Secretary of the Northwestern, director of the Chicago & Milwaukee Company.

The company has declared a 5 per cent. cash dividend on preferred stock, payable on the 30th instant.

Chicago Engineers' Club of the Northwest.

This club held its annual meeting in this city, at the Sherman House, on the evening of the 12th inst. The President delivered his annual address, and officers for the ensuing year were elected.

Chicago & Alton.

There have been various rumors to the effect that this company, together with the Pennsylvania and Kansas Pacific companies, has formed an association to be known as the "Illinois, Missouri & Kansas Association," having for its object the purchase of the North Missouri Railroad, which is to be sold next August, under a deed of trust.

It may perhaps be true that negotiations looking to this end have been had by the companies mentioned, but up to this time the arrangement has not been consummated, and possibly may not be.

Chicago, Rock Island & Pacific.

The contract for the construction of the branch from Washington to Sigourney was let last Wednesday.

Lake Shore & Michigan Southern.

The company publishes the following notice:

"At a meeting of the Board of Directors of this company, held on the 8th day of June, 1871, it was Resolved, That it be recommended to the stockholders of this company, to authorize the issue of the fifteen millions of dollars of the capital stock of this company remaining unissued, and that a meeting of the stockholders be called, to be held at the office of the company in the city of Cleveland, Ohio, on Thursday, the 27th day of July next, at 11 o'clock a. m., to vote upon the question of such authorization.

"For the purpose of ascertaining the parties entitled to vote upon the question, the stock transfer books will be closed on the 28th day of June, instant, and remain closed until further notice."

OLD AND NEW ROADS.

Prince Edward Island.

The government of this colony advertises that it will receive proposals until the 19th of July next for the construction and equipment of a 3-foot 6-inch-gauge-railroad about 120 miles long, which will extend across the island from east to west in the direction of its greatest length, from Georgetown to Cascumpec. The island varies in width from 10 to 35 miles. Specifications can be seen at the government office in Charlottetown.

Buffalo, New York & Philadelphia.

This road, formerly known as the Buffalo & Washington, and in operation for some time from Buffalo

southeastward, 18 miles to East Aurora, is now open to Holland, 9 miles further, and is progressing so rapidly southward that it is believed that trains will be running to Cattaraugus Creek, 16 miles from Holland, in July, and to Olean, on the Erie Railway, about 75 miles from Buffalo, before winter.

Salisbury & Baltimore.

The construction of this road, from Salisbury, in the southeastern part of Maryland, northwestward, has been begun. It is expected the road will be graded within the next four months, and completed ready for operation by November next. The road, when in operation, will form an outlet for the coal mines in that part of Maryland.

Richmond & Danville.

The Richmond (Va.) *Dispatch* says: "The Danville *Times* makes an important announcement in stating that the Pennsylvania Railroad Company has concluded a contract for the purchase of a large part of the State's interest in the Richmond & Danville Railroad. If the *Times'* information is correct, it may be confidently inferred that the Pennsylvania Company will establish a complete rail line from Washington to Atlanta, Ga. The construction of the air line from Charlotte, N. C., to Atlanta is to progress partly through the means of this company. That link will shorten the distance between Washington and Atlanta 150 miles. When that is done, and we have all-rail communication between Richmond and Washington, the route by this city to the Gulf cities will be the shortest and most expeditious of all."

The Pennsylvania Railroad Company some months ago had surveys made for a branch of the Richmond & Danville road from Greensboro, N. C., due south to Cheraw, S. C., completing a line to Charleston, S. C.

Toledo, Wabash & Western.

The Williamsport (Ind.) *Republican* says: "The Toledo, Wabash & Western Railroad Company is now engaged in the surveying of a new railroad from Williamsport, to connect with that part of the Lafayette, Muncie & Bloomington road that lies in the State of Illinois, which, we believe, is now owned by the Toledo, Wabash & Western Railroad Company. The new road from Williamsport is to connect with the other road two or three miles southwest of the northwest corner of Warren County, Ind."

Indiana Northern.

Articles of association of the Indiana Northern Railway Company were filed recently with the Secretary of State. This road is designed to run from Newcastle, Henry County, through the counties of Rush, Hancock and Shelby, via Knightstown and Fairland, there connecting with the Cincinnati & Martinsville road; thence by said road through the counties of Shelby, Jackson and Morgan, to a station on the railroad called Van Sicks, or Mahalasville; thence through Morgan and Monroe counties to Bloomington—a distance, altogether, of 190 miles. The capital stock is fixed at \$2,900,000.

Whitby & Port Perry.

This company purposes to construct a railroad from Whitby, on Lake Ontario and the Grand Trunk Railway, 30 miles east of Toronto, northward 18 miles to Port Perry, which is situated on a small inland lake. It is reported that the company has determined to build the line on the 4-foot 8½-inch gauge, instead of the 5-foot 6-inch gauge, as formerly intended. This, if true, is somewhat remarkable, as the Grand Trunk will be its only railroad connection.

Canada Pacific.

Canadian papers announce that arrangements for the survey have been completed. The points to be explored are between Lake Nipissing and Lake Winnipeg, on the eastern end, and on the Pacific end through the mountain ranges. The plains intermediate present no difficulties, and will not be surveyed. The work will be divided among eighteen or twenty parties, each taking a section of seventy or eighty miles. Something of the character of the route will, it is expected, be known in time to be reported at the next session of Parliament.

Geneva & Southwestern.

Under this name a company has been incorporated in New York, whose object is to construct a railroad from Geneva, on the New York Central Railroad, southwestward through the towns of Seneca, Gorham (or as near as practicable to the village of Bethel) to the village of Rushville, thence through the towns of Middlesex, Italy and Naples, via the village of Naples, to a point in the town of Cohocton, Steuben County, at or near Blood's Corners, on the Buffalo, New York & Erie Railway, a distance of 37 miles. Amount of capital stock, \$1,000,000. The directors are: Hon. Emory B. Pottle, James Covell, Hiram Maxfield, Naples; Edwin R. Parish, Italy; M. A. Pearce, A. C. Lindsley, Hon. Oliver S. Williams, Middlesex; Emmett C. Dwelle, D. B. Holbrook, Potter; Richard M. Washburn, James Pulver, Gorham; Corydon Wheat, Alex. L. Chew, Geneva.

Midland & Mackinac.

There is a project to construct a narrow-gauge railroad from Midland, Mich., on the Flint & Pere Marquette Railroad, 19 miles northwest of East Saginaw, northwestward about 50 miles to Houghton Lake, and thence, eventually, due north to the Straits of Mackinac.

North Missouri.

The St. Louis *Times* has given currency to a rumor that the North Missouri Railroad is about to pass into the hands of new owners, with M. K. Jesup, of New York, at the head. The plan is to bid the road off at the sale, which is to take place in August, under the second mortgage, and thus wipe out the third mortgage, the eight millions of stock and the floating debt, which amounts to two or three millions of dollars more. If the scheme works, the Illinois, Missouri & Kansas will, says the *Times*, purchase a road with \$20,000,000 of capital, and paying a dividend upon that sum for seven or

eight millions, or a little more than a third of its real value.

If there is anything in this report, it is probable that the Chicago & Alton, the North Missouri, and the Missouri, Kansas & Texas will form a system of allied roads, the North Missouri affording the outlet to St. Louis, and the Chicago & Alton to Chicago.

Norfolk & Memphis.

The Memphis (Tenn.) *Appeal* of the 1st instant says: "The proposition to consolidate the roads from Memphis to Norfolk is approved along the whole route. A meeting occurs, at an early day, of the officers of the several connecting roads, by which a plan of consolidation will be defined. The wealth of many States concentrated at Norfolk and Memphis, there will be no difficulty in sustaining the Allan Line of steamers; and then the whole railway system of the South will be speedily drawn to Memphis by the bridge which must span the Mississippi, and which a Memphis and Norfolk road would have the wealth and power to build."

The line from Norfolk to Bristol, on the Tennessee line, 408 miles, is now controlled by the Atlantic, Mississippi & Ohio Railroad Company, under General Mahone, and to complete it to Memphis will require the absorption of the East Tennessee, Virginia & Georgia road, from Bristol to Chattanooga, 242 miles, and the Memphis & Charleston, from Chattanooga to Memphis, 309 miles, making a line 959 miles long.

Springfield & Illinois Southeastern.

Work on the gap between Pana and Edgewood was commenced last week, and the contractors intend proceeding with the work to its completion without interruption. It is expected to close the gap as soon as next November.

The extension of this road from Springfield northwestward to Beardstown, on the Illinois River, was to be completed this week, and regular trains are promised after the 25th inst.

Gilman, Clinton & Springfield.

About 50 miles of the track of this road has been laid, from Gilman southwestward, and work is progressing rapidly. There is about 60 miles more to lay.

Plymouth, Kankakee & Pacific.

The contract for grading the Indiana Division of 90 miles was let to Hawkins, Willard & Co., of Chicago, on May 25. They were to commence the work of grading at Plymouth on Monday, June 12, and it will be put through as rapidly as possible. The officers are using all the means possible to have the road in operation by November next as far west as Bureau Junction, Ill., that being the western terminus. The work from that point east to the Indiana State line is now nearly completed.

St. Paul & Pacific.

By the new location of the southern line of this road, it is likely that it will not be directed so far south as Big Stone Lake, as was at first reported, but will reach the Bois de Sioux River near Lake Travers, and not more than 25 miles south of Beckinridge, which was originally intended to be its terminus. Track-laying has been resumed on the extension beyond Benson. About 30 miles of grading have been completed, and the remainder—about 30 miles—is to be done very soon. The branch from this main line, northwest to a junction with the Northern Pacific, near Otter Tail Lake, will be graded next month, and is to be in operation by fall.

California Pacific Railroad, Eastern Extension.

The general route of the proposed line is given in the articles of incorporation as "commencing at a point at or near the town of Davisville, County of Yolo, State of California; thence northerly through the Sacramento Valley; thence in a northeasterly direction, crossing the northern boundary of California, at a point near Goose Lake, to a point near Christmas Lake, in the State of Oregon; thence easterly through the State of Oregon, the Territory of Idaho, and the Territory of Utah, to Ogden City, Utah. Also from a point on the first-named route, in the bend of the Pitt River, near the 41st parallel of latitude, northwesterly to a junction in the State of Oregon with the railroad of the Oregon & California Railroad Company. Also from a point on the first-named route near Christmas Lake, westerly to a junction with the railroad of the Oregon & California Railroad Company, at or near Lower Klamath Lake, in the State of Oregon. In all, 943 miles of railroad, or thereabouts." Five hundred thousand dollars of the stock has already been subscribed.

Alabama & Chattanooga.

A telegram from Chattanooga dated the 14th says: "The committee of creditors of the Chattanooga & Alabama Railroad Company, after consultation with Mr. Stanton, recommend resistance by all lawful means to the present movement to put the road into bankruptcy; that Mr. Stanton be appointed to operate the road, and a financial agent selected to receive and disburse all incomes; that debts due laborers and employees be paid first; that a full examination be made of the actual situation of the road and its present indebtedness, and that the extension of one, two and three years, with interest at 8 per cent., be granted Mr. Stanton, in whose honesty and ability to pay every dollar of debt they express full confidence."

Another telegram of the same date says: "Much excitement is reported in Chattanooga, by passengers from that place, occasioned by the seizure of trains on the Alabama & Chattanooga Railroad, and stopping them, by a mob of unpaid employees. The stopping of trains prevents transportation of supplies to other employees on the line of the road, who are in a state of starvation. Business houses in Chattanooga are closed, fearing a mob. Mr. Stanton, builder of the road, avers that he is not to blame for this state of affairs; that if left alone he can pay out. The Chinese employees demand to be sent back to California, willing to abandon their claims."

Middletown & Unionville.

It is reported that the difficulties between this and the Erie have been settled and that the Erie will operate the Unionville road until the Midland takes possession.

Lake Superior Ship Canal, Railroad & Iron Company.

This company, by virtue of various statutes of the United States and of the State of Michigan, has franchises and land-grants for: 1st, the canal across Keweenaw Point, in Lake Superior, by way of Portage Lake; 2d, for a railroad from water navigation on Lake Michigan to the iron lands of the company; and 3d, the working of the iron lands of the company upon royalty or otherwise.

The canal will cut off Keweenaw Point and save about 150 miles of navigation between Ontonagon and Marquette. It will be about 24 miles long, one on each side of Portage Lake, which will form part of the channel. This canal is the more important as all the town of Lake Superior are on the south shore, and none of importance on the point, and it will enable vessels sailing from Duluth to the Sault Ste. Marie, to touch at Bayfield, Ontonagon, Houghton and Marquette without any considerable deflection from a straight line. The company owns 600,000 acres of land, substantially in one body, a large part of which has copper and iron mines. The company proposes to issue bonds to raise money for the completion of its canal, the construction of its railroad, and the prosecution of mining operations.

St. Joseph & Denver City.

Another eight miles of this road is now under construction. Messrs. Claggett & Evans, of St. Joseph, have the contract for the grading.

The New Jersey Lease.

The adoption, at the meeting of the stockholders of the United Railroad Companies of New Jersey on Wednesday, of a resolution approving the course of the Joint Board in furthering the proposed lease of the companies' property to the Pennsylvania Central Railroad Company, has occasioned some commotion. The expectation was that the resolution would meet with considerable opposition, and the emphatic "nays" of several of the stockholders when the resolution was voted upon justified the anticipations. One stockholder stated to several of his friends at the meeting that he would not give his assent to the lease, and that without the assent of all the stockholders to have their stock converted into bonds of the Pennsylvania Central the lease could not be made valid.

It is only necessary, however, to have the assent of the owners of two-thirds of the stock to make the contract valid. There are now 72,912 shares of the New Jersey Railroad stock held by the stockholders, and the owners of over 48,000 shares are, it is claimed, in favor of the lease. Since it is among the stockholders of this company that the malcontents are found, it is considered that the opposition does not amount to much. The officers of this company think that the contract will be fully made by the 1st of July, and they are endeavoring to consummate the lease by that date, the terms of the contract being such that, if this is done, the Pennsylvania Central Company are to take the earnings of the company for this year, and to pay the 10 per cent. dividend on the stock.

That the contract will be made by the 1st of July is considered certain, unless its opponents procure delay by litigation. Mr. Black, the prominent member of the opposition, owns 500 shares, \$50,000 worth of stock, and no stockholder, it is said, either favorable or unfavorable to the lease, owns more than 800 shares. It is furthermore asserted that the majority of the opponents of the scheme are not heavy stockholders, and that, therefore, their opposition will not have the requisite weight. Should the scheme fall through, the officers are preparing to pay a five per cent. dividend by the 1st of August, and part of this, they say, will come from the surplus funds, as did one-third of the 10 per cent. dividend of last year.

The 10 per cent. which the Pennsylvania Central proposes to pay would make an annual rent of \$1,948,500, and they would take exclusive possession of all the rolling and floating stock, buildings and real estate of the New Jersey Railroad, Camden & Amboy Railroad, and Delaware & Raritan Canal. It is considered more than probable that litigation will be tried to delay the fulfillment of the contract, if made.—*New York Tribune*, June 4.

Keokuk Bridge.

A Keokuk dispatch says the bridge across the Mississippi River at that point was opened on the 13th, and that trains will cross regularly hereafter. Wagon and foot passenger traffic commenced on the 14th, at which time the bridge was thrown open to the public.

Madison & Portage.

At a special election in Madison, Wis., on the 8th inst., to vote \$25,000 aid to the Madison & Portage Railroad, the vote resulted in 131 majority in favor of raising the tax—the vote standing 240 for, 103 against.

Baraboo Air Line.

Track is going down on this extension of the Chicago & Northwestern, and is to be laid from Madison to Lodi by the 1st of July, and to Baraboo by the middle of August.

St. Louis & Iron Mountain.

A difficulty has arisen in adopting the gauge of this road—particularly between St. Louis and Carondelet—to carry the 4-feet, 8½-inch-gauge cars from the Illinois roads, and also to connect advantageously with the Southern 5-feet-gauge roads. The small difference between the gauges does not admit of laying a third rail, and, to accomplish the desired result, the President of the company, Mr. Allen, has devised patterns for a double-headed steel rail, weighing 85 pounds to the yard, and the patterns and an order have been sent to England for fulfillment.

Missouri, Kansas & Texas.

What is known as the "Osage Division" of this road is an isolated line, extending from Holden, on the Missouri Pacific, 43 miles west of Sedalia, and 50 miles southeast of Kansas City, a little south of west to Harrisonville, the county seat of Cass County, a distance of 20 miles, now in operation. Arrangements have been made with counties on the line, by which this Division will be extended 30 miles further to Paola, Kansas, by the first of October. It is expected that it will be continued still further, about 70 miles, to Emporia, and thus serve as an eastern outlet for the northern part of the Neosho Division.

Chesapeake & Ohio.

The Cincinnati *Gazette* says: "We have learned that the charter of the Chesapeake & Ohio provides for a branch from their main line at the mouth of Green Brier River to the Virginia & Tennessee Railroad at or near where the latter crosses New River. This branch will probably be built at an early day to accommodate the local mineral traffic, and we learn that such are the intentions of the company. If so, it is a very important fact to Cincinnati. It will give to Cincinnati & Ohio the shortest route to the seaboard south of Richmond. It will also be nearer to Lynchburg and Knoxville than the existing lines. The line from Lynchburg to Danville is under construction, so that if we make a direct communication with the Chesapeake & Ohio we shall connect with an entire new system of Southern railroads, which will give us a 'Southern road' without leave of Kentucky. If the jealousy of that State shall prevent the road to Chattanooga, we shall have full half the benefit of any such line with an expenditure of a fifth part of the money."

This branch would extend from the Chesapeake & Ohio southward up the valley of New River to the Atlantic, Mississippi & Ohio Railroad, at or near Central Station, 96 miles from Lynchburg. It would be about 50 miles long. The connection to Knoxville from Cincinnati by this route would be extremely circuitous, and to the South Atlantic coast, quite indirect.

West Wisconsin.

The St. Paul *Pioneer* of the 10th says: "The West Wisconsin Railroad Company have completed arrangements for the immediate construction of a bridge across the St. Croix River. The bridge is to be constructed at a point north of Willow River, three-quarters of a mile above the business portion of Hudson, and is to be completed in November next, by which time the company intends to have the road completed to Hudson, and the grading, ready for the iron, finished to its junction with the St. Paul, Stillwater & Taylor's Falls Railroad. It is also the intention of the latter company to have their road in operation this fall, thus completing another competing line for Minnesota exports and imports."

Fort Scott & Allen County.

This company has closed a contract with Gen. Smith & Co., of New York, for grading 42 miles of their road from Fort Scott, Kan., west to the Missouri, Kansas & Texas road, beyond Humboldt, west of the Neosho River. The contract is for the grading, masonry, bridging, culverts, etc., making the road-bed ready for the ties. The consideration is \$275,000 in county and township bonds, and the work is to be finished by the 1st of July, 1872.

International Railroad.

Horace Greeley, during his recent visit to Texas, in a letter to the *Tribune*, expressed his opinion of this road as follows: "This road, though begun last November at Hearne, where it crosses the 'Texas Central,' and impeded by the necessity of importing corn at a cost of \$2.10 per bushel, and hay at \$85 per ton, for its oxen and mules, has been pushed right vigorously in either direction, and will have crossed both the Brazos and Colorado, and reached Austin on the one hand and the Trinity on the other by next May. Two years hence it will have been completed from Fulton to San Antonio (400 miles), and will then have brought the heart of this State within four days' travel of the commercial emporium, where it will be known as one of the most judicious and successful railway enterprises ever planned." It will carry more beef cattle than any road on the globe, and it will bring into Texas more immigrants than railroad ever carried into any State till now."

Texas Great Northern.

Mr. Greeley describes this as the line which is to meet the Missouri, Kansas & Texas, extending from Fort Towson (on Red River, due south of Fort Gibson) southward through Tyler to Houston, about 75 miles west of the line of the Texas Central.

Canada Midland.

It is proposed to extend this railroad, now in operation from Port Hope, on Lake Ontario 63 miles east of Toronto, northwestward 43 miles to Lindsey, in the same direction about 80 miles to Georgian Bay, forming a line nearly parallel with and a little longer than the Toronto & Collingwood road. The success of the effort will depend largely on subscriptions from towns on the line. The company is offering in London an issue of £235,000 6 per cent. first-mortgage bonds at 85.

Worcester & Nashua.

The Boston *Advertiser* of last week says this company "has nearly completed its second track as far west as Boylston. It will be in running order for the cars in about a week. The grading is mostly completed and the rails nearly all laid for the double track for the remainder of the distance to Sterling Junction; so that by July, probably, arrangements will be completed for the putting on of the additional early and late trains which has been contemplated, to accommodate the increasing travel on this road. The managers of this road have completed arrangements with the Norwich & Worcester and Concord, N. H., railroads, to run a

through car from New London, Conn., to the White Mountains."

Washington & Ohio.

This corporation—once the Alexandria, Loudoun & Hampshire company—has 44 miles of road in operation, from Alexandria northwest to Hamilton. It is said by the *Washington Chronicle*, that the construction of the extension from the present terminus to Winchester will soon be commenced.

Liberty & Vienna.

This Ohio road, ten miles long, is in course of construction from Liberty—on the Cleveland & Pittsburgh Railroad, near the Pennsylvania line—north to Vienna. The grading is nearly completed and most of the ties are in place. The *Youngstown Chronicle* says that 19 car-loads of iron have already arrived and that track-laying has been begun. It is expected to have all the iron laid by the first of July.

Indiana & Illinois Central.

The Indianapolis *News* says: "The gentlemen who have now taken the Indiana & Illinois Central Railroad in charge, have control of abundant means, and intend to build the line just as fast as it can be done, which will probably be more rapidly than any Indiana road was ever constructed. Grading has commenced at a number of points, and contracts for the whole work will be let out about the 15th of this month. The road will be built in the best and most substantial manner, with all the latest improvements, including the fish-joint. Six thousand tons of iron have been bought already, one thousand from the mill at Decatur, Ill., and five from an English firm, together with the fish-plates, nuts, bolts, washers, etc., necessary for the whole road."

Fairbury, Pontiac & Northwestern.

Track-laying on this road was completed on the 12th inst. between Streator—at the junction of the Fox River Valley Division of the Chicago, Burlington & Quincy Railroad with the Western Division of the Chicago & Alton—and Pontiac, about 20 miles, and it is expected that it will be completed to Fairbury, about ten miles further, before the end of this month.

Mississippi Valley & Western.

The company's lines is to extend from West Quincy up the Mississippi to Keokuk (completed from West Quincy to Canton, 15 miles), and from Canton northwest to the southern tier of counties of Iowa, and thence westward to the Missouri. A correspondent writes concerning it:

"The road is open for business from Quincy to Canton, and there are two regular trains each way daily. Col. Buel was ordered by the board to push the extension to Keokuk and west to the North Missouri Railroad as fast as men and money can do it, and he expects by January next to open 115 miles of new road, running through the richest part of North Missouri. The work is being done in first-class style in all respects. The portion just opened is pronounced by railroad men as being the best new road ever built west of the Mississippi River."

Sioux City & St. Paul.

Last week Captain Gere, Engineer of the company, commenced the final location of the road from St. James to Sioux City. The St. Paul *Press* says: "The road has been graded 30 miles southwest of St. James. Another stretch of the grading work, extending over a distance of 20 miles, is now being done, and will be completed at an early day. Of the 30 miles already graded this season, the bridging and culverts are completed for a distance of fifteen miles—the latter being in readiness for the iron. Three miles of track has been laid. The latter portion of the work of building will progress more rapidly hereafter, as a new engine, designed expressly for the business of track-laying, was turned out at Shokopee yesterday."

"There are nearly a thousand men at work on the extension west of St. James, and construction is going forward with wonderful rapidity."

"Not the least important information is the fact that the company have determined not to limit themselves to the fifty miles already under contract to be built this year, but will continue grading upon the line without cessation or interruption, and it will be finished through to Sioux City this year, and thus the company will be enabled to commence running trains through from St. Paul to Sioux City early in the month of July next."

Boston & Nashua.

The annual report of the directors places its earnings, including roads operated by them, at \$513,381; the expenditures and rents, \$414,853. A resolution was passed authorizing the directors to contract for operating the Petersborough Railroad from Wilton to Greenfield, when completed.

Catawissa Railroad.

The extension of this Pennsylvania railroad is so far completed that it is expected that trains will be running over it by the 1st of September.

Allegheny Valley.

The contract for the construction of the heaviest part of what is known as the "Bennett's Branch Extension" of this road was let on the 1st inst., embracing about 32 miles. This has been sublet to fifteen different parties, and at low figures considering the nature of the work and the inaccessibility of some of it, to which supplies must be hauled for 50 miles. The entire length of the road will be 98 miles, and it will extend from the Allegheny Valley road at or near Mahoning a little north of east up the Mahoning Creek, and down Bennett's Branch to the Pennsylvania & Erie road, at or near Driftwood Crossing from the Allegheny to the Susquehanna River.

The Pennsylvania and the Baltimore & Ohio in the South.

The Augusta *Chronicle* says: "The Pennsylvania Central and the Baltimore & Ohio roads are now contending for the control of the trade of the South At-

lantic coast. The objective point of these rival corporations is New Orleans and the cotton belt. The Pennsylvania Central has already secured one line to the Southwest, and is now rapidly pushing forward another—through Georgia—constructing the Atlantic & Richmond Air Line, which it proposes to extend through Atlanta toward Oxford, or to some point on the Chattanooga & Meridian road in that line of direction. The Pennsylvania Central, disdaining State aid, buying up all the bonds of the Air Line road, which had been issued bearing the State's endorsement, and returning them to the Comptroller, thus boldly attacks the whole of the existing railroad system of Georgia. It is under this state of affairs—under the assurance of friendly aid connection—that an opportunity is offered to the Baltimore & Ohio to connect with the railway system of Georgia at Augusta. On the same subject the Baltimore *Gazette* says: "It rests with the Baltimore & Ohio road to decide upon its own policy. It does seem to us that instead of preparing to build a road costing \$12,000,000, to Chicago, and another costing \$20,000,000, to New York, where it only obtains competing routes, it would accomplish much greater results by spending a few hundred thousands in the South, and securing controlling ones. If Baltimore and the South look to the Baltimore & Ohio Railroad much longer in vain, they will finally turn elsewhere. Successful as that corporation has been, it may bury its talent once too often. Already the attention of many is attracted by the enterprise of the Pennsylvania Central, and the day may yet come when Baltimore and the South will tender to a Northern corporation privileges which were offered in vain to a Southern road."

The *Gazette* seems to forget the Pennsylvania is already strong in the South, controlling, or at least having some interest and influence in, a large number of railroads, so the Baltimore & Ohio is sure to have competition there as well as in the North, while the traffic of the Northwest is incomparably greater and growing incomparably faster than that of the South.

New York Viaduct Railroad.

At a recent meeting of the directors the subscription books were opened and stock was subscribed for, as follows:

Shares.	Shares.
A. T. Stewart.....100	W. R. Travers.....500
William M. Tweed.....500	Richard O'Gorman.....100
August Belmont.....500	J. J. Bradley.....200
William Duncan.....500	John T. Johnston.....250
C. L. Tiffany.....Reserved	Henry Hilton.....500
Richard B. Connolly.....250	W. T. Blodgett.....350
A. Oakley Hall.....500	E. B. Wesley.....250
J. J. Astor.....500	F. D. Lanier.....100
Peter B. Swenney.....50	C. A. Lamont.....500
L. F. Morton.....Reserved	F. A. Osgood.....250
Hugh Smith.....500	Jose F. Navarro.....500

John Q. Jones, resigned his position as a member of the board, and Joseph Seligman was appointed in his place.

It was voted to allot five hundred shares each to Levi P. Morton, Henry Smith and Mr. Seligman, who were absent, and one hundred shares to Manton Marble, who was also absent.

Cincinnati & Southwestern.

Articles of association of the Cincinnati & Southwestern Railroad Company were filed with the Secretary of State of Indiana on the 13th inst. The proposed road is to leave the Ohio & Mississippi at Mitchell, Indiana, and intersect the Ohio River at Mt. Vernon, making a very direct route from Cincinnati and the southeast corner of Indiana, and well situated to connect with the railroads extending southward from the Ohio River. It is about 100 miles long.

Among the incorporators are General A. P. Hovey, General J. C. Veach, John A. Mann, J. F. Millburn, Robert Mitchell, James M. Glenn, and other prominent Cincinnati and Indiana. The directors are Hon. Josiah Kirby, Robert Mitchell, Col. P. P. Lane, L. H. Sargent, J. M. Glenn, N. G. Nettleton and J. Hibbard, of Cincinnati; E. H. Sabin, of Rockport, Ind.; Jos. F. Wilburn and Colonel John A. Mann, of Mount Vernon; C. W. Bowers and Milton M. Moore, of Mitchell; Clement Doane and M. Friedman, of Jasper, Ind. The officers are Josiah Kirby, of Cincinnati, President; E. H. Sabin, Vice-President; H. H. Tatam, Secretary and Treasurer.

Erie Railway.

Four elegant drawing-room coaches are constructing for the Erie at the Elmira car shops. They are to surpass any others yet made, and are to be called the Niagara, Newport, New York City and Buffalo City. The Niagara will be ready for the road next week, its trial trip to Binghamton being set for next Tuesday. The Newport will be finished by June 13, and the other two by the 1st of July. They are designed especially for the day express trains, and will run between New York and Niagara Falls, over the new Buffalo & Suspension Bridge Branch.

Twenty-five thousand gallons of milk are shipped daily over the Erie from Orange County to New York City, at a cost of \$2,500 for freight.

Engineer Taft has made the fastest railroad time over the Erie on record. He ran a full passenger train between Port Jervis and Deposit, 90 miles, in 110 minutes, including four stops. He ran 16 miles during the trip in 23 minutes, and passed three mile-posts (two full miles) in one minute and forty-six seconds, according to the testimony of a leading railroad man, a passenger on the train.

The matter of the lease of the Monticello & Port Jervis Railroad is still pending before the Erie managers. —*New York Tribune*.

Milwaukee & St. Paul.

The Milwaukee *Sentinel* of the 14th inst. makes the following announcement of a decision made at the recent annual meeting of the Milwaukee & St. Paul Company:

"It had been decided by the Milwaukee & St. Paul Railway Company to commence the construction of a new road between this city and Chicago immediately.

The charter has already been secured, the preliminaries are all arranged, and there will, therefore, be no delay in inaugurating the work. The road will be built as nearly as possible on an air line, and will be ironed with steel rails, and made in all respects as perfect as may be. It is the purpose of the company to put the running time down to two hours between the cities, and this can easily be done, considering the manner in which it is proposed to build and equip this line."

A telegram reports that the new road is to be run "in as straight a line as can possibly be drawn between the two cities, and most of it will therefore be some distance inland from the lake." The straightest line possible between Chicago and Milwaukee would run along the lake for five or six miles in the vicinity of Lake Forest, but would for the most part be within three miles or less of the shore—about four miles distant at Racine and three miles at Kenosha—and it would be but a very few miles shorter than the present lake shore line. It is more than probable, if there is to be a new road from Milwaukee to Chicago, that it will run a little to the west of south for about 15 miles to a point near the south line of Milwaukee County and about nine miles from the lake shore, and thence nearly due south, for the most part along the Des Plaines River, to Libertyville, Lake County, Ill., six miles west of Rockland Station on the Chicago & Milwaukee road, and thence on as straight a line as possible to Chicago. This would make a line quite as short as the present road, would have a local traffic of its own and give an opportunity for the founding of a new series of suburban towns, part of the profit of which and the whole of their traffic could be gained for the new railroad.

Bangor & Piscataquis.

The President of this company advertises for proposals for the construction of an extension of its road from its present northern terminus at Foxcroft, Me., west to the village of Guilford, a distance of about eight miles, to be completed by the 1st of October.

Elyton, Corinth & Tennessee River

A company of this name has been organized to build about 140 miles of road, from Elyton, Alabama, northwest to Corinth, Miss., and from thence about 15 miles northeast, striking the Tennessee River in Tennessee, near the Mississippi line.

Kansas Central.

A new company with this title proposes building a narrow-gauge (3 feet) road from Leavenworth to Denver, to connect with the Denver & Rio Grande road, already commenced. The company asks Leavenworth to donate their \$250,000 stock in the Kansas Pacific Company, and proposes to build the road at a rate of not less than 100 miles a year.

Des Moines Valley.

It has been reported at various times lately that a sale of this road had been made to the Chicago, Burlington & Quincy Company. The Keokuk *Gale City* gives the statement "on pretty good authority" that no actual sale has yet taken place, but that Messrs. Reid, Kibbourne & Leighton are now in New York for the purpose of making the sale to any company that will buy it.

Union Pacific.

Financial journals report that Messrs. Morton, Rose & Co., of London, brought out on the 5th inst. the Land Grant Loan of the Union Pacific Company—\$3,000,000, or about £600,000, of the original loan, still in the ownership of the company—at the rate of 70 per cent. sterling. The whole amount was subscribed, and the scrip (or privilege) sold subsequently at 1 per cent. premium, or 71 per cent. sterling for the bonds. Messrs. Bischoffsheim & Goldschmidt and Messrs. Raphael & Son, of London, have taken an interest in this negotiation.

Southern Transcontinental.

At a special meeting of the stockholders of the Southern Transcontinental Railroad Company in New York on the 13th inst., it was resolved that a committee of three be appointed to confer with the Texas Pacific Railroad, with power to negotiate with them for the sale of their property. The following were appointed such committee: Edward Pierreport, E. B. Hart and M. R. Traverse.

The St. Louis Union Depot.

A telegram from St. Louis dated the 10th inst. says: "The meeting of railroad men having in view the building of a grand union passenger depot here, which was held yesterday, reconvened to-day, decided upon a plan of organization and adopted articles of association. The capital stock is to be \$3,000,000. The cost of the enterprise is estimated as follows: Real estate, \$700,000; tunnel, \$615,000; depot building, \$1,000,000. The following subscriptions to the stock were made: Ohio & Mississippi Railroad, \$100,000; Toledo, Wabash & Western, \$250,000; St. Louis, Vandalia & Terre Haute, \$100,000; Indianapolis & St. Louis, \$50,000; North Missouri, \$100,000; Illinois & St. Louis Bridge Company, \$100,000; Pittsburgh, Cincinnati & St. Louis, \$250,000; Pennsylvania Central, \$200,000; Iron Mountain, \$50,000; Chicago & Alton, \$50,000, and \$160,000 by nine private individuals, making an aggregate of \$1,500,000.

"A meeting was then held, and the following directors elected: Wm. Taussig, North Missouri; D. Torrance, Ohio & Mississippi; A. Boody, Toledo, Wabash & Western; W. K. McKean, St. Louis, Vandalia & Terre Haute; Jas. B. Eads, Bridge Company; J. S. Mitchell, Chicago & Alton; Thos. Allen, Iron Mountain; Thos. A. Scott, Pennsylvania Central; E. W. Woodward, Indianapolis & St. Louis.

"A meeting of the directors was then held, and Wm. Taussig was elected President; D. Torrance, Vice President; E. W. Woodward, Secretary *pro tem.*, and J. H. Britton, Treasurer. The President was directed to prepare a report in regard to the selection of the

site for the depot grounds, the cost of the same, etc., to be submitted to an adjourned meeting on June 26.

"In addition to the \$3,000,000 capital the company will issue \$2,000,000 in first mortgage 7 per cent. gold bonds."

Estimates for a Narrow-Gauge Railroad.

The following estimate has been made for the cost per mile of railroad of 3-feet 6-inch gauge, to be constructed in Prince Edward Island. It will be 120 miles long:

Clearing, grubbing, etc.....	\$ 200
Fencing, gates and warning boards.....	700
Grading.....	8,500
Level crossings and road division.....	100
Bridging and culverts.....	300
Rails, fish-plates, spikes and bolts.....	3,500
Track-laying and lifting.....	450
Sleepers.....	600
Ballasting.....	850
Stations.....	600
Rolling stock.....	1,800
Engineering and management.....	1,800
Land and land damages.....	200
Sidings.....	700
Total.....	\$15,300

TRAFFIC AND EARNINGS.

—The receipts of the Great Western Railway of Canada, for the week ending May 19, 1871, were:

Passengers.....	\$29,536 30
Freight and Live Stock.....	53,373 62
Mails and Sundries.....	2,420 00

Total Receipts for week.....	\$85,334 92
Corresponding week, 1870.....	76,995 91

Increase (11 per cent.).....\$8,339 01

—The Atlantic Cable, or Anglo-American Telegraph Company, according to the report at the annual meeting of the stockholders, earned during the year 1870 the sum of \$1,162,820, which, added to a balance of \$6,290, from the previous year, gives \$1,169,110 as the available receipts of the past year. The working expenses, together with the charges of completing buildings, purchasing ships and stores, and repairing cables, amounting to \$380,605, leaving a balance of \$788,505, out of which three dividends of 2 per cent. each, free of income tax, were paid, absorbing \$472,120, and leaving \$316,385. A further dividend of 3 per cent. was declared at the recent meeting of the stockholders, leaving a balance of \$80,130. The balance sheet showed an expenditure of \$8,531,775, of which \$8,375,000 were charged to capital, \$210,235 to loans, and \$46,520 to lease-hold property and furniture. The two latter items are in course of payment out of the earnings, so that the capital stock amounts to \$8,375,000.

RAILROAD LAW.

Carriers.—Nature of their liability.—What amounts to delivery.—Notice of arrival of goods.—Removal.—Want of ordinary care and diligence.—Burden of proof.

In the case of *Goodwin et al. vs. The Baltimore & Ohio Railroad Company* (58 Barb.) the following points were decided:

Common carriers are liable in two capacities, one as insurers and one as warehousemen. If an injury happened to goods from any cause except the act of God or the public enemies, while the carriers are insurers, an action lies against them by the owners for damages, and is made out without further inquiry.

But if the injury happens after the goods are claimed to have been delivered, the question arises whether the defendants' liability as common carriers, in all its rigor, had, under the circumstances, ceased; and if so, whether the defendants had exercised that care of the property required of them as warehousemen.

Carriers are bound to deliver goods transported by them. Delivery is not affected by placing the property in a position where it cannot be obtained by the owner or consignee.

A quantity of sheet-iron, consigned to the plaintiffs, at New York, and transported by the defendants, was unloaded upon the wharf, in New York. The plaintiffs received notice of the arrival of the ship in which the iron was brought, and received a small portion of the iron uninjured. On sending for the remainder, they were unable to get it for some days after it was placed upon the pier, by reason of other freight having been so placed that the iron could not be reached. While in this position it was damaged by rain. *Held*, that the defendants were bound to deliver the goods at the usual place, and to deliver them in a conveniently reasonable method for their removal; and that the plaintiffs are bound to exercise reasonable diligence in removing them. *Held, also*, that it was for the jury to determine whether a reasonable time had elapsed after notice of the arrival of the iron, for the plaintiffs to remove it before it was injured by the rain. That after the expiration of a reasonable time, the liability of the defendants as insurers ceased, and their duty or liability became that of warehousemen, which required that they should exercise over the property, and for its protection, ordinary care and diligence.

That the burden of proof was upon the plaintiffs to show that the defendants did not use such care and diligence; and if the jury found that negligence was proved, the defendants were liable even though their duty as common carriers was ended.

Carriers.—Rule of damages for breach of contract.

In the case of *Grund vs. Pendergast* the following principles were determined—(58 Barb.):

The rule of damages which prevails in an action for the breach of a contract to transport goods, where the owner is unable to procure the goods to be carried in any other manner, does not apply when upon the failure of the carrier to perform the owner of the goods can send them by another conveyance.

In such a case the owner must send the goods by another conveyance; and if he does so, he will be entitled to recover the difference between the price at

which the defendant undertook to carry the property and the price which was compelled to pay for its transportation.

Common Carriers—Burden of proof where loss arises from an excepted cause—Dangers of navigation—Accidents which do or do not raise a presumption of negligence—The new rule in the Federal courts at variance with the rule in the State courts.

In the case of the *Western Transportation Company vs. Downer*, which went up from the Northern Circuit of Illinois to the Supreme Court of the United States, a very important position has been assumed by the latter court—one of eminent advantage to common carriers. The ruling, in substance, is this: that where the carrier gives sufficient evidence to justify the jury in inferring that the loss arose from an excepted cause, though on the whole evidence the cause be left doubtful, the burden of proof is on the plaintiff to establish negligence. This rule is at variance with the one established in the principal State courts.

The action was brought in the Circuit Court for the Northern District of Illinois, against a carrier for injury to coffee shipped on one of its boats from New York to Chicago. At the trial the plaintiff proved the delivery of the coffee to the defendant in good condition, and its arrival at Chicago damaged; and then rested. Defendant then proved that by the bill of lading they were exempted from liability for losses by the "dangers of navigation on the lakes and rivers;" that the boat in its attempt to enter the harbor of Chicago struck on the bottom, grounded and lay until the next day, shipping so much water as to ruin the coffee; that the vessel was staunch, and that the captain was a careful and experienced seaman. Considerable evidence was given by defendants, and subsequently by plaintiff, by which it appeared that the vessel undertook to enter at about eight o'clock on a dark and stormy night; that the channel of entrance to the port was narrow and somewhat shifting—in fact had shifted somewhat during the two seasons previous to this accident; that the captain had not entered the port for about two years previous, and that another vessel drawing more water had come safely into the port somewhat later the same night. There was considerable conflict of testimony as to the proper course for a master to pursue under the circumstances, and the prudence and skill of the captain's action in this case.

The defendant requested the court to charge that "if the jury believe from the evidence that the loss of the coffee in controversy was within one of the exceptions contained in the bill of lading offered in evidence—that is to say, if it was occasioned by perils of navigation of the lakes and rivers—then the burden of showing that this loss might have been avoided by the exercise of proper care and skill is upon the plaintiff; then it is for him to show that the loss was the result of negligence."

This the court declined to do, and charged that "the bill of lading in this case excepts the defendants from liability, when the property is not insured, from perils of navigation. It is incumbent on the defendant to bring itself within the exception, and it is the duty of the defendant to show that it has not been guilty of negligence."

To both of these points defendant excepted, and the jury having found a verdict for plaintiff, the defendant brought this writ of error.

The court held that the same points were involved as in *Clark vs. Barnwell*, 12 How., 272, and decided substantially as follows:

In an action against a carrier for injury to goods, an instruction that "if the jury believe from the evidence that the loss of the coffee in controversy was within one of the exceptions contained in the bill of lading—that is to say, if it was occasioned by perils of navigation of the lakes and rivers—then the burden of showing that this loss might have been avoided by the exercise of proper care and skill is upon the plaintiff; then it is for him to show that the loss was the result of negligence," was a correct statement of the law, and should have been given.

Where the carrier has given evidence from which the jury may infer that the injury occurred from a cause excepted in the bill of lading, the burden is cast on the plaintiff to show negligence.

An instruction that "the bill of lading in this case excepts the defendant from liability of perils of navigation; it is incumbent on the defendant to bring itself within the exception, and it is the duty of the defendant to show that it has not been guilty of negligence," is erroneous. The terms "danger of lake navigation" include all the ordinary perils which attend navigation on the lakes, and among others, that which arises from shallowness of the water at the entrance of harbors.

A presumption of negligence from the simple occurrence of an accident seldom arises except where the accident proceeds from an act of such a character that, when due care is taken in its performances, no injury ordinarily ensues from it in similar cases, or where it is raised by the mismanagement or misconstruction of a thing over which the defendant has immediate control, and for the management or construction of which he is responsible.

Inquest of Damages in Railroad Cases—Competency of stockholders as jurors.

In the case of *Peninsular Railroad Company vs. Howard* (50 Mich.) it has just been decided in Michigan that:

1. A stockholder of a railroad corporation is not competent to sit as a juror upon an inquest impeached to determine the necessity of taking, and the compensation to be allowed to the owner of land taken for the use of the corporation, and the verdict of a jury, one or more of whose members are thus qualified, is void.

2. Railroad corporations seeking the condemnation of lands for their use, must, at their peril, raise such objection to the competency of a juror, when it is known to them; and it is the duty of the juror himself to disclose such interest.

Negligence—The duty of railroad companies concerning cattle on the track—They must be protected if possible.

The law of the State of Illinois with respect to the duty of railroad companies towards cattle on the track is set forth in the following abstract from the opinion of the Supreme Court of Illinois in the recent case of *The Illinois Central Railroad Company vs. Baker*:

"This was an action against the Illinois Central Railroad Company, then using and operating a portion of the Toledo, Peoria & Warsaw Railroad, for killing, by negligence, a colt of the plaintiff, of the value of one hundred dollars. The jury returned a verdict for the value of the colt, for which the court gave judgment, having overruled a motion for a new trial.

"The defendants appeal to this court, and insist the motion to set aside the verdict should have been allowed, it being contrary to the evidence.

"There was some slight conflict in the testimony as to where the colt got on to the track, whether in or outside of the limits of the town of New Benton. The jury might have found it either way, and it would not change the aspect of the case as we view it. We place it on the ground of great negligence in not stopping the train, then running at a slow rate of speed, so as to have given the animals, for there were two others with the colt, a chance to leave the track. The driver saw them in time to have done so, but did not do it, but rather pursued them a considerable distance, as if with intent to kill them.

"In the case of the same company against *Middleworth*, decided at this time (46 Ill., 494), negligence of this character, or even ordinary negligence, will subject the company to damages.

"If by the use of ordinary care and diligence, animals on a railroad track can be saved from injury, it is the duty of the company to employ that degree of care. If they do not, they are liable. No other rule would afford sufficient protection to animals which are lawfully on a railroad track, as this court has so often decided they are, if they get upon it from the range or commons.

"The evidence sustaining the verdict, and the instructions being proper, the judgment must be affirmed."

Railroads as Warehousemen—The Liability of Companies for Goods Consumed by Fire in Depots—Wool Waste Spontaneous Combustion—Negligence as to Condition of Depot.

In the very interesting case of *Whitney et al. vs. The Chicago & Northwestern Railway Company*, recently decided in the Supreme Court of Wisconsin, the law as to the liability of railroad companies as warehousemen was very exhaustively examined and the results are summed up in the following points:

That the plaintiffs could not be compelled to elect whether they would charge the company for the property destroyed by fire upon the liability of a common carrier or that of a warehouseman. That it was the duty of the company to provide reasonably safe depot buildings in which freight and property transported over its road might be securely stored when convenience and necessity required that such property should be placed in store.

The court states what facts may be given, etc., in evidence to show the condition of the depot in which the wool was burned, and what particular negligence must be alleged in the complaint.

That inexperienced persons might not know that wool waste, under certain conditions, was liable to spontaneous combustion, and therefore persons experienced in handling wool, and who possessed peculiar knowledge upon the subject of wool waste, might properly testify as to its nature and quality, and how it was regarded in the trade.

That the court below properly instructed the jury if the depot was burned by reason of the spontaneous combustion of wool waste stored therein, and by the exercise of that care and attention which ordinarily prudent men exercise in the care of their own property, the servants in charge of the depot would have discovered such dangerous article, and so store it that in case of spontaneous combustion it would not have endangered the entire contents of the building, and if they failed so to do, the defendants were chargeable with negligence as warehousemen.

That the company, as a warehouseman, was liable for all damages caused to the wool, by the want of ordinary care and diligence in storing and keeping it, and if the company, when the transit was ended, was unwilling to assume this responsibility, it should have deposited the property in the warehouse of a third party.

That it was proper to allow interest.

Rights of Street Railroads in Philadelphia.

The case of the *City of Philadelphia vs. Thirteenth and Fifteenth Streets Passenger Railway Co.*, in which the construction of the local statutes were involved, has just been decided to the following effect:

1. The City of Philadelphia is a competent party to a bill to restrain an illegal use of a public highway by an attempt to lay a passenger railway track thereon.

2. Property holders alleging private injury on the line of such railway are also competent.

3. The act of February 16th, 1849, § 19, does not apply to railways whose charters do not limit the time for completing their roads.

4. The act of May 16th, 1861, authorizing the consolidation of railroads, has no application to passenger railways.

Priority of Record as to Railroad Land.

At the January term, 1871, of the Supreme Court of Wisconsin, in the case of *Wagner vs. Fountain and others*, the following opinion was given:

1. Persons who took deeds of land after the recording of a deed from their grantor to a railroad company, covering in part the same land, are chargeable with notice of the company's rights; and the existence of a fence erected by it along the track, at the time of conveyance to such persons, does not estop the company from claiming beyond such fence.

2. One who took possession under a land contract

from said grantor before the company's deed was recorded, but after it was made, and when the company was in possession thereunder, is also bound to take notice of its rights.

Contributory Negligence—Plaintiff's negligence must not concur—The effects of whisky.

The recent case of *Toledo, Peoria & Warsaw Railway Company*, decided by the Supreme Court of Illinois (47 Ill., 514), the following were the important facts:

The plaintiff had been to Peoria, with a load of wood, and was returning home, in the afternoon. By his own statement he had been drinking somewhat freely of whisky, and the testimony of other witnesses shows he was in such condition that he paid no attention to the shouting of two persons, only ten or twelve steps from him, just before he crossed the track. The evidence further shows that the railroad track was in full view as he approached it, a train being visible 1,145 feet from the crossing by a person on the highway ten feet from the track, a train being nine hundred feet from the crossing.

Under these circumstances the court renders this opinion:

"It is evident then that the plaintiff, by the exercise of even less than ordinary prudence, might have discovered and avoided the approaching train. He did not do this, but either in a state of partial stupefaction from drink, or acting with a reckless temerity utterly inexcusable, he undertook to cross, with the train in full view, if he had but looked along the track, thus wantonly imperiling not only his own life, but that of the passengers on the train. While the highway traveler cannot be required to leave his vehicle, or adopt any other unusual means to discover an approaching train, he cannot be permitted to voluntarily close his eyes to danger or to rush into it with utter recklessness, and then claim compensation for injury."

Negligence—Walking upon the track—The benefit of railroads.

In the case of *Mary Finlayson, Administratrix, vs. the Chicago, Burlington & Quincy Railroad Co.*, recently heard before Judge Dillon in the United States Circuit Court at Des Moines, Judge Dillon laid in clear language the duties of persons who walk upon railroad tracks, and incidentally showed that railroads are not such unmixed evils as petit juries are sometimes inclined to believe. From his charge to the jury, which is as good law as it is good sense, we make the following extracts:

"Railroads present, in their motive power, and in the manner in which they are necessarily conducted, a powerful instrument of good, and, also, to some extent, of evil. It is, or ought to be, the object and aim of all good citizens to increase the good and to diminish the evil.

"Those of you who have traveled here from a distance to attend this term of court, on railroads, and who remember the inconvenience, and, I might say, the suffering of the same journey in the old stage coaches, can well appreciate the good which railroads do, and those of you who have listened to the detailed testimony in this case have seen the capacity of a railroad for evil. There can be no question, however, but that they are a necessary and useful institution in this country. We should, therefore, by a just administration of the law, so far as it depends upon courts and juries, and by proper legislation, so far as it depends upon legislative bodies, do all we can to diminish the evils which seem, in some sense, to be incidental to these great moving powers.

"I am, gentlemen, happy in the consciousness that I am addressing a jury who will consider the case before it without being influenced by any prejudice against railroads, on the one hand, or by any undue sympathy for the unfortunate woman who is the plaintiff in this case, while you would do her full and complete justice.

"* * * In this case the uncontradicted evidence on both sides is, that the man who was killed was walking on the track of the defendant corporation, along the same course the train was going that struck and killed him, and the question arises, what degree of precaution or care a railroad company or its employees are bound to take to guard against injuring a man under such circumstances.

"I instruct you, as a matter of law, in the first place, that the officers of this corporation, the men who had charge of the train, had a right to presume that this man was a man of sound mind and good hearing, and that the case is not to be considered by you in regard to the diligence of these officers as if he were a dumb man, known to the parties, nor as if he were a child which the parties could see was incapable of taking care of itself.

"I instruct you that the agents of the railroad company had a right to suppose that he was such a man of sound mind and sound hearing, and that he would take reasonable care to protect himself in case of danger. Under that view of the case, I further say to you that the agents or officers of the company were bound to give a reasonable and fair notice of their approach, when they found that the man was not taking steps to get out of the way—such a notice as would reach a man under ordinary circumstances of good hearing and who had his attention alive to his condition.

"* * * And I further say to you that the fact that in the place and at the time where this accident occurred there was a noise arising from the work on the canal, and a confusion arising from other trains running along the canal bank they were working on, which might be confounded with other trains, which fact was well known to the man who was killed, does not vary the matter. That was reason for additional care and diligence on his part. For knowing that he was traveling along a place where a loud noise would impair his power of hearing any bell from a train, or a whistle from a train, it was his duty to be more vigilant and more careful, and to watch closely to protect himself.

"I lay it down to you, that he had no legal right to be on that railroad track; the track at that place not being a crossing, or any part of a public highway, was private property; that it was not built for other purposes; that it was not built to be walked upon by the public, and the fact that persons did walk upon it, however frequently and however common, does not change the proposition of law. This man had no right to be there, and he should not have been there. It does not follow, however, because he was there unlawfully, that the other party could run him down, but it does follow that he being on private property of the company, on a track which is used for a purpose which is dangerous to human life, well known to him, that he, being in a place where he ought not to be, that he was bound to use every precaution, every diligence, every care, against the possibility or probability of any danger which might happen to him there.

"This was his duty, and it was imperative; and if you find in the language of one of the counsel for the plaintiff, that he was going along the track with his hands in his pockets, his head down, and his attention abstracted from everything around him, then I tell you he was guilty of such negligence as forbids recovery in this suit.

"No man has a right to go upon a railroad track in such a place, and go along in a state of abstraction, careless of what might happen to him, and then turn around and say to the railroad company, however negligent they may have been, you are responsible for my safety. If he is careless himself, it can't be expected that the railroads can be made to take care of him, and pay for him if he is killed. Being on the track and walking in a direction where a railroad train might overtake him, reasonable care required of him that he should be vigilant and watchful to discover the approach of any train, and especially from behind, and this vigilance on his part should be increased, from the fact that the noise from the trains and the blasting on the canal would tend to prevent his hearing the noise made by the approach of a car or train, or its bell, or its whistle."

The Borrowing Power of Corporations.

Students of social science have long since agreed that association has been the most potent of the many levers employed by modern civilization in its career of material progress. In an age marked by a growing indisposition to entrust to governments any powers not deemed absolutely essential to the maintenance of the State, association alone could render possible the creation of those vast works of public utility which are the wonder even of their own creators, and which would have been impossible save for that union and concentration of numberless individual efforts which we describe as the principle of association. Railroads, telegraphs, banks, life and fire insurance, steamships, bridges, tunnels and canals, are all enterprises that the spirit of the age has been unwilling to commit to government management and government control, and which in their magnitude were entirely beyond the means of private individuals, even in this age of colossal fortunes. Association has rendered them possible. Hence we are accustomed to look upon association as one of the most beneficent powers of our modern civilization, are indisposed to scrutinize its influences too closely, and are forever tempted to frown down all attempts to disparage a system to which we must acknowledge ourselves so largely indebted. Yet it would be no exaggeration to say that the results of association to-day are, perhaps, fully as pernicious as they were beneficent twenty years ago. Not that nature has changed, not that society has changed, not that association has in itself ceased to be powerful for good, but that true association scarcely exists any longer, and that the outward forms and semblances of association have been and are seized upon and perverted to utterly improper purposes.

The principle of association is the union of large numbers of small amounts of capital into one grand whole, and entrusting the employment of that capital to the management of one or more individuals selected by the owners and contributors of the capital. It is evident that the essential features of the system are: the contribution of capital, the control of the capital by the owners and contributors by means of the selection of managers; the responsibility of the managers toward the contributors; and the division of profits among the original contributors of the capital. Of all these essential features of the system, not one remains in the practice of to-day. The last thing contributed by the founders of associative enterprises is capital. Those that do contribute capital in such form as it ever is contributed, have no particle of control over the management. The managers are not in the least responsible to the contributors of capital, nor do the latter participate in the profits, though they are invariably made to bear the whole losses.

The perversion of association began when it was discovered that associations could borrow. Large undertakings, to which large capitals had been actually contributed, and which possessed valuable property, were early recognized as admirably safe borrowers, and speedily acquired great and general credit. As long as their borrowings were confined to large amounts, only to be obtained from great capitalists, wealthy firms, or other large associations like themselves, no strikingly evil results followed. For all these classes of lenders necessarily have the ability and caution to investigate the condition of enterprises to which they advance large amounts, and generally have the indirect influence to control in a measure the money so advanced. But when it was discovered that the property of an association could be mortgaged, and the bonds divided up into numberless small amounts, and that lenders could be found who would advance money on the security of such a bond and a mortgage, and that large amounts could in that way be borrowed from numerous small lenders, who advanced their money on the general reputation of the corporation, and whose limited means of

inquiry and scattered influence had ceased to be a power—then the ability to borrow money became the destruction of the system of association. Naturally, at first money was borrowed in this fashion on mortgage bonds by associations who possessed property to mortgage, whose original contributors or shareholders had really contributed large amounts of capital, which they controlled by means of the managers of their election, and had consequently a powerful interest in securing honest and skillful managers to preserve the property. The theory in those days was that the shareholders or actual contributors of capital had so large a stake in the success of an enterprise, that its management was safe in their hands, and that the property mortgaged to the lenders of further amounts of capital was wisely left to the original owners. In the early days of corporation loans, this belief proved generally well-founded, and so high became the credit of corporations, and so extremely convenient was the form of security devised, that large classes of investors, both of large and small amounts, habitually lent their capital to the various large corporations by buying their mortgage bonds, and that mortgage bonds came to be recognized as a safe and desirable form of investment.

It must be evident that the safety and desirability of this form of investment depends essentially upon two things: the existence and value of the property, and the character of the management secured by the stockholder and original contributors of capital. Both these considerations are, however, entirely disregarded in the modern system of forming corporations. The original contributions of capital, the actual stockholder, the property in existence, are all found to be totally unnecessary, nay cumbersome, and a modern corporation is virtually nothing but a device by means of which a few individuals can borrow enormous sums of money without personal responsibility; can use this money, without the slightest interference on the part of the lender or anybody else, for such purposes as they see fit; can devote this money to the most dangerous and hazardous enterprises, the loss in which, if any, falls upon the lender—the profit in which, if any, reverts to the individual; and can do, under the guise of a corporation, a number of things which, if done as individuals, would stamp them as cheats, swindlers and rogues. With some few rare exceptions, the entire system of association to-day is nothing but a shield authorized by law to protect dishonest men from the legal consequences of dishonorable actions.

An association to-day, in ninety-nine cases out of a hundred, is not an association of men who unite their capital for some joint enterprise. It is, on the contrary, an association of men who never put a dollar of their own into such an enterprise, but who, under the false pretence of having thus risked their own money, borrow the money of others. Of all the railroad companies formed in the United States within the last five years, not five per cent. ever had any capital of their own. A dozen men procure a charter, subscribe nominally a certain amount of the stock, constituting themselves the stockholders; a stockholders' meeting is then called, and the twelve elect themselves directors, and, under the pretence of representing a body of stockholders, whose capital is supposed to lend respectability and solvency to their enterprise, proceed to commit a variety of acts which not one of them would dare to do as an individual unprotected by his official character, as a director acting under instructions from his stockholders—that is, from himself. Money is borrowed in enormous sums on the security of a mortgage upon property which does not exist; the entire risk of the success of the enterprise falls upon the lender of the money, the buyer of the mortgage bonds, for there is no one else upon whom it can fall; the unfortunate lender thinks himself amply secured by a mortgage upon some existing property, and further protected by the watchfulness of a large body of stockholders who are supposed to have invested their capital in the enterprise. A better scheme for borrowing money without incurring any liability was never devised. The lender surrenders all right to interfere for twenty years or more, so long as his interest is punctually paid, and the borrower, so long as he pays the interest, is almost untrammelled in the uses to which he may put the principal.

If the evil results of this system were confined to the relations between the borrower and the lender, great as might be the mischief which will some day flow from it, it would be insignificant compared to the evils which it already daily inflicts upon the community. The whole legislation concerning corporations is based upon the original theory and practice of association, as we have described it. In order to induce the formation of companies, the responsibility of individual stockholders was legally limited to the extent of their share in the property of the company—in other words, the shareholders were virtually by law freed from all responsibility of whatever kind. In order to give the shareholders unlimited control over their property, the directors were made responsible almost exclusively to their stockholders, whose capital interest in the enterprise is supposed by the law, as well as by the public, to be ample guarantee that they will authorize no wrongful act on the part of the directors. But, under the modern practice, the directors being generally the chief, if not the sole, stockholders, are responsible as directors only to themselves as stockholders, and as stockholders they are responsible to nobody, while they have not even that limited responsibility as stockholders which they would have if they had invested capital in the enterprise, for the simple reason that they did not invest at any. In this way the law has created a number of associations or corporations, which are supposed, from their inherent nature, to exercise a control over the actions of their representatives, but which, by the very law itself, are absolutely shielded from all responsibility. There are to-day in the United States hundreds of associations, consisting each of them of a very limited number of individuals, upon

whom the law confers enormous privileges, who, upon the strength of a sort of traditional reputation of corporations in general, borrow hundreds of millions of money from deluded investors, and are by the law itself absolutely free from all responsibility. It is this borrowed money that is used to corrupt legislators, to buy privileges, to influence judges and sustain armies of lawyers, to resist the just claims of the public, and to maintain the entire system of corporate tyranny which threatens to make the principle of association odious in the eyes of the people and render it practically useless in the future.

No thoughtful person to-day doubts that the associative principle as now put in practice is no longer endurable. Either great works that cannot be accomplished by individual means must cease, which is almost equivalent to bidding civilization cease its progress, or means must be found to limit the power or to increase the responsibility of the managers of corporations. Whether this generation is equal to the task may well be doubted. But certain it is that no measure will ever be effective that is not based upon a restoration of the old original rule that the capital of an association must be furnished by the associates, and that borrowing must be restricted within very narrow limits, if not entirely prohibited. It is the borrowing power that destroys the responsibility of the managers, that has virtually eliminated the stockholder from all modern corporations. It is only by destroying the borrowing power that the stockholders can be brought back into existence, and the people prevented from plunging into some hasty action to rid themselves of the insufferable tyranny, fraud, plunder, and corruption of the great corporations who are to-day the masters, not the servants of the people.—*The Nation*.

Charter of the "Pennsylvania Company."

The following extracts from the charter of this company will indicate the limits—want of limits, perhaps, would be a better term—of its operations. The charter was granted by the Pennsylvania Legislature in 1870.

SECTION 1. The company shall have perpetual succession, and all the privileges, franchises and immunities incident to a corporation; may sue and be sued, implead and be impleaded, complain and defend in all courts of law and equity, of record and otherwise; may purchase, receive, hold and enjoy, to them, their successors and assigns, all such lands, tenements, leasehold estates and hereditaments, goods and chattels, securities and estates, real, personal and mixed, of what kind and quality soever, as may be necessary to erect depots, engine-houses, tracks, shops, and other purposes of the said corporation, as hereafter defined by the second section of this act, and the same from time to time may sell, convey, mortgage, encumber, change, pledge, grant, lease, sub-lease, alien and dispose of, and also make and have a common seal, and the same to alter and renew at pleasure, and ordain, establish and put in execution such by-laws or ordinances, rules and regulations as may be necessary or convenient for the government of the said corporation. * * *

Sec. 2. That the corporation hereby created shall have power to contract with any person or persons, firms, corporations, or any other party however formed, existing or that may hereafter exist, in any way that said party or any of them may have authority to do, to build, construct, maintain, or manage any work or works, public or private, which may tend or be designed to improve, increase, facilitate, or develop trade, travel, or the transportation and conveyance of freight, live stock, passengers and any other traffic, by land or water, from or to any part of the United States or the Territories thereof; and the said company shall also have power and authority to supply or furnish all needful material, labor, implements, instruments, and fixtures of any and every kind whatsoever, on such terms and conditions as may be agreed upon between the parties respectively, and also to purchase, erect, construct, maintain, or conduct, in its own name and for its own benefit, or otherwise, any such work, public or private, as they may by law be authorized to do, including also herein lines for telegraphic communication, and to aid, co-operate and unite with any other company, person or firm in so doing.

Sec. 3. The company hereby created shall also have the power to make purchases and sales of, or investments in, the bonds and securities of other companies, and to make advances of money and of credit to other companies, and to aid in like manner contractors and manufacturers, and to receive and hold, on deposit, or as collateral or otherwise, any estate or property, real or personal, including the notes, obligations and accounts of individuals and companies, and the same to purchase, collect, adjust and settle, and also to pledge, sell and dispose thereof, on such terms as may be agreed on between them and the parties contracting with them, and also to endow and guarantee the payment of the bonds, and the performance of the obligations of other corporations, firms and individuals, and to assume, become responsible for, execute and carry out, any contracts, leases or sub-leases made by any company, to or with any other company or companies, individuals or firms whatsoever.

Sec. 4. The company hereby created shall also have power to enter upon and occupy the lands of individuals, or of companies, on making payment therefor, or giving security according to law, for the purpose of erecting, constructing, maintaining or managing any public work, such as is provided for or mentioned in the second section of this act, and to construct and erect such works thereon, and also such buildings, improvements, structures, roads or fixtures as may be necessary or convenient for the purposes of the said company under the powers herein granted, and to purchase, make, use and maintain any works or improvements, connected or intended to be connected with the works of the said company, and to merge or consolidate or unite with the said company, the improvements, property and franchises of any other company or companies, on such terms and conditions as the said company may agree upon; and to fix and regulate the tolls or charges to be charged or demanded for any freight property or passengers traveling or passing over any improvement erected, managed or owned by the said company, or on any merchandise or property transported over any road whatever by said company, and to make from time to time dividends from the profits made by said company. The several railroads managed by said company shall continue taxable, as heretofore, in proportion to their length within this State respectively, and the said "Pennsylvania Company" shall be taxable only on the proportion of dividends on its capital stock, and upon net earnings or income, only in proportion to the amount actually carried by it within the State of Pennsylvania, and all its earnings or income derived from its business beyond the limits of this Commonwealth shall not be liable for taxation.